LORAIN *Products Corporation*

power board Instructions

- INSTALLATION
- OPERATION
- MAINTENANCE

MODEL 1233V3

DESIGNERS AND MANUFACTURERS OF

power equipment without moving parts SUB-CYCLE® CONVERTERS AND FLOTROL® RECTIFIERS

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LORAIN MODEL 1233V3

POWER BOARD

Spec. No. 5821-027 Serial No. 2860

This Power Board includes equipment per Assembly Drawing J-5821-027 and is assembled per outline drawing _____ as follows:

Quantity	List	Equipment	
	1	200 Amp	Common equipment, wiring & assembly for one 48 volt Power Board (Includes one 8'-0" x 23" relay rack and multiple 0-30 amp fuse panels.)
	2	400 Amp	
1	3	800 Amp	
	4	200 Amp	Common equipment, wiring & assembly for one 48 volt Power Board (Includes one 8'-0" x 23" relay rack and (4) 0-30 amp fuse panels with space for one Rectifier.) See List 15, 16 or 17.
	5	400 Amp	
	6	800 Amp	
	7	800 Amp	Common equipment, wiring & assembly for one 48 volt Power Board arranged for remote distribution (Includes one 8'-0" x 23" relay rack.)
	8		Remote distribution bay for use with List 7 (Includes one 8'-0" x 23" relay rack and (6) 0-30 amp fuse panels.)
	9	One 1ϕ Rect	Supplemental bay (Includes one 8'-0" x 19" relay rack, ventilation baffle and one or two 100 amp Rectifiers.)
	10	Two 1ϕ Rect	
	11	One 3ϕ Rect	
	12	Two 3ϕ Rect	
	13	One 3ϕ Rect	Supplemental bay (Includes one 8'-0" x 23" relay rack, ventilation baffle and one or two 200 amp Rectifiers.)
	14	Two 3ϕ Rect	
	15	1ϕ, 100A	Rectifier required in addition to List 4, 5, or 6.
	16	3ϕ, 100A	
	17	3ϕ, 200A	
	18	400 Amp, 3ϕ Rectifier for use with List 2, 3 or 7. (Free standing cabinet)	
	B	Additional distribution fuse panel (8) 31-60A positions with bus link and (8) associated ground distribution lugs.	
	A	Additional distribution fuse panel (8) 0-30A positions with bus link and (8) associated ground distribution lugs.	

LORAIN PRODUCTS CORPORATION WARRANTY

Lorain Products Corporation warrants that all equipment manufactured by it shall be free from defects in material and workmanship. The corporation will, at its option, replace or repair free of charge and pay surface carrier charges on any adequately packed equipment covered by its warranty which shall be returned to the factory within 90 days from date of turn-on and found to be defective. All circuit components are warranted for two years from the original shipping date from the factory and which upon examination prove to be defective in material or workmanship. The corporation recommends that all shipments of equipment be inspected by the customer for hidden damage upon receipt from the carrier to insure that a timely claim be filed, if necessary, by the customer. Lorain Products Corporation will not pay claims for shipping damages.

Systems and Equipment Not Economically Returnable To The Factory

In the event that the product involved is a system or equipment which, in the judgment of Lorain Products Corporation, is not economically returnable to the factory or if Lorain Products Corporation has performed the installation, supervised the installation, or performed testing and turn-on, circuit components and Lorain repair labor are covered by this warranty for the first 90 days from date of turn-on and circuit components are warranted for two years from the date of shipment. Upon request, Lorain will send a service technician to the site to determine if the unit is defective in circuit components or workmanship, and will repair the equipment. If the failure is Lorain's fault, no invoice for circuit components or repair labor will be issued if the complaint has been issued within the first 90 days from date of turn-on. If the complaint is issued more than 90 days from the date of turn-on but within two years from the date of shipment, the customer will be billed at the prevailing Customer Service rates but will not be billed for circuit components. If the problem occurs after two years from the date of shipment, circuit components and repair labor are billable.

If the problem has been created by misuse or abuse of the equipment or by malfunction of associated equipment or by environmental conditions, at any time after shipment, the customer will be billed for circuit components and labor.

General Provisions

Lorain Products Corporation shall not be obligated to pay any costs or charges incurred by the customer or by any other party. In no event will Lorain Products Corporation be liable for consequential damages. No waiver, alteration or modification of any of the provisions herein shall be binding on Lorain Products Corporation unless in writing and signed by an authorized official of Lorain Products Corporation. If, during any warranty period, the subject equipment has, in the opinion of Lorain Products Corporation, been modified or misrepaired, the warranty will be void unless the modifications or repairs have been made after consultation with the corporation and upon the recommendation of the corporation.

LORAIN MODEL 1233V3
48 VOLT DC POWER BOARD

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1. DESCRIPTION

1.01 The Model 1233V3 Power Board provides 48V DC to power DC loads from 200 to 800 amperes. A charging circuit containing LORAIN FLOTROL Rectifiers maintains the 24 cell battery in a fully charged condition while powering the DC loads. The DC voltage provided by the rectifiers and batteries is applied through distribution circuitry to the customer loads.

1.02 The Power Board is equipped with rectifier fail and fuse alarm circuits which will provide local alarms and also extend office alarms and CSACS alarms, when the power board is used with a centralized status alarm and control system, in the event of a rectifier failure condition or in the event any fuse on the power board should open.

1.03 The power board also contains a voltage alarm relay which will provide a local alarm and also extend office alarms and CSACS alarms, when the system is used with a centralized status alarm and control system, if load voltage should increase above 56V DC or decrease to 46V DC.

1.04 A voltmeter and an ammeter, located on the Power Board, indicate DC load voltage and current respectively.

2. INSTALLATION

Mounting

2.01 The Model 1233V3 Power Board is relay rack mounted with the exception of the Model RHM400D50 Rectifiers which are floor standing units. Refer to Assembly Drawing J-5821-027 for dimensions and equipment arrangement.

Electrical Connections

2.02 All installer input and output connections, as well as all interbay wiring is shown on Wiring Diagram

T-5821-027. For required electrical connections to the individual FLOTROL Rectifiers, refer to the Power Data Sheet ("PD" Sheet) contained in the separate Rectifier instruction manual.

Location

2.03 This Power Board operates best in an area having an ambient temperature range between 0°C (+32°F) and +50°C (+122°F).

3. OPERATION

3.01 During normal Power Board operation, the FLOTROL Rectifiers maintain the associated 24 cell battery in a fully charged condition while also powering the DC customer loads, as required.

3.02 A meter and control panel provides local alarms and extends office alarms and CSACS alarms in the event any FLOTROL Rectifier should fail or in the event of an open distribution fuse in the Power Board.

3.03 The meter and control panel also contains a voltage alarm relay circuit which will provide office alarms and CSACS alarms, if load voltage should increase above 56V DC or decrease to 46V DC.

3.04 For operational details of the FLOTROL Rectifiers used in this Power Board, refer to the separate Rectifier instruction manual.

Controls and Indicators

3.05 The controls and indicators listed below are located on the Power Board Meter and Control Panel. For a description of the controls and indicators associated with the FLOTROL Rectifiers, refer to the separate Rectifier instruction manual.

Rectifier Fail Alarm Lamp RFA: This red indicator lamp will illuminate in the event one or more of the FLOTROL Rectifiers should fail. The lamp will remain illuminated until the rectifier fail condition is corrected.

High/Low Voltage Alarm Lamp HLV: This red indicator lamp will illuminate any time DC load voltage exceeds 56V DC or decreases to 46V DC. The lamp will remain illuminated until the load voltage is returned to normal limits.

Fuse Alarm Lamp FA: This red indicator lamp will illuminate in the event any Power Board control or distribution fuse should open. The lamp will remain illuminated until the open fuse is replaced.

Rectifier Alarm Cutoff Key RECT ACO and Associated Lamp RECT GD: Failure of any Rectifier in this Power Board will illuminate lamp RFA and extend office and CSACS alarms. The RECT ACO key may be used to turn off the external office alarm, if desired, by turning locking key RECT ACO from the horizontal to the vertical position.

When the RECT ACO key has been activated, lamp RECT GD will light to indicate that the alarm has been turned off. However, lamp RFA will remain illuminated and the CSACS alarms will remain extended until the Rectifier failure is corrected.

External Alarms

3.06 This Power Board contains provision for extending office alarms and also CSACS alarms when the system is used in conjunction with a centralized status alarm and control system. External alarms, if connected, will be activated in the event of any of the following alarm conditions:

a) Rectifier Fail Alarm

b) Fuse Alarm

c) High/Low Voltage Alarm

3.07 The external alarm terminals may be strapped to provide resistance battery, ground, or closed loop alarms. Refer to Table F on Wiring Diagram T-5821-027 for alarm strapping details.

Starting and Stopping

3.08 To place the Power Board into operation, start the FLOTROL Rectifiers following the startup procedure contained in the separate Rectifier instruction manual.

3.09 If it is desired to shut down the Power Board for maintenance or test, simply turn off the FLOTROL Rectifiers following the procedure contained in the separate Rectifier instruction manual.

DANGER

Even after the Power Board has been shutdown, hazardous AC and DC voltage are present throughout the Power Board. To remove all power from the Power Board, the battery must be disconnected and the AC input to the Rectifiers disabled at the external distribution point.

Metering

3.10 The meter and control panel on the Power Board contains a DC voltmeter and an ammeter to indicate load voltage and current respectively.

3.11 The Rectifiers also are equipped with voltmeters and ammeters to indicate output voltage and current respectively.

4. ADJUSTMENT

General

4.01 For adjustments associated with the FLOTROL Rectifiers used in this Power Board, refer to the adjustment section in the separate Rectifier instruction manual.

4.02 The only adjustments associated with the Power Board are the high and low voltage alarm settings of voltage relay circuit card A2 on the meter and control panel. The high and low voltage adjustment procedure is given below.

High/Low Voltage Alarm Adjustment

4.03 The High/Low Voltage Alarm Adjustment is made on voltage alarm relay circuit card A2 located behind a protective

cover on the meter and control panel. The voltage alarm relay is factory adjusted to provide an alarm when load voltage exceeds 56V DC or decreases to 46V DC. It is recommended that no change be made in the adjustment setting. However, if readjustment becomes necessary, follow the procedure below.

NOTE: Potentiometers R6 and R3 on circuit card A2 adjust the high and low voltage limits respectively. In the event the high or low voltage setting must be changed, the low voltage setting should be adjusted first as it sets the range of the high limit.

Test Equipment Required

1) Variable 0-60V DC Power Supply capable of supplying 0.5 amps.

2) Multimeter or DC voltmeter capable of measuring 60V DC (required only if adjustable DC supply is not equipped with meter).

Adjustment Procedure

1) Open the protective cover to expose the plug-in printed circuit cards on the meter and control panel.

2) Remove supply fuse VAR, located on the meter and control panel, and connect variable test voltage source observing correct polarity, negative to receptacle pin A and positive to pin S of circuit card A2.

CAUTION: Polarity of both DC supply voltage and test voltage connections to the voltage sensing circuit is critical; incorrect polarity will damage the voltage sensing assembly.

3) Adjust test voltage to value at which low-voltage alarm is desired. Turn screwdriver adjustment of potentiometer R3 clockwise,. if necessary, until relay K operates and alarm is turned off; then adjust shaft of potentiometer R3 counterclockwise, slowly, until relay K releases and alarm is given. This sets the low limit.

4) Adjust test voltage to value at which high-voltage alarm is desired. If necessary, turn screwdriver adjustment of potentiometer R6 counterclockwise until relay K operates and alarm is turned off; turn adjustment shaft of potentiometer R6 clockwise, slowly until relay K releases and alarm is given. This sets the high limit.

5) Remove the Power Supply and replace supply fuse VAR, then close the circuit card access cover. The adjustment procedure is now complete.

5. CIRCUIT DESCRIPTION

General

5.01 Electrical circuits of this Power Board are shown on Wiring Diagram T-5821-027 and Schematic Diagram SD-5821-027 furnished in this instruction manual. The description given below

describes only the alarm and control circuitry on the meter and control panel in the Power Board. The circuit description for the FLOTROL Rectifiers are given in the separate instruction manuals for the Rectifiers.

High/Low Voltage Alarm Circuit

5.02 Voltage alarm relay circuit card A2 monitors the load voltage of the Power Board. In the event the load voltage should increase to 56 volts or decrease to 46 volts, relay K on circuit card A2 will release to supply ground to illuminate lamp HLV. Additional contacts of relay K will actuate external office and CSACS alarms, if connected. A brief description of the High/Low Voltage Alarm Circuit Card A2 is given below.

5.03 Relay K on circuit card A2 is normally operated. The relay releases to give an external alarm when DC supply voltage either increases or decreases to preset values. Current to operate relay K is supplied by a voltage detector circuit described below.

5.04 Two voltage sensing networks compare a portion of the voltage being monitored with a constant voltage developed across a zener diode in the voltage detector circuit. The low-voltage sensing network is adjusted so that during a low voltage condition, the voltage developed across a portion of it is lower than the constant zener diode voltage. The high-voltage sensing network is adjusted so that during a high voltage condition, the voltage developed across a portion of it is higher than the constant zener diode voltage. If the voltage being monitored should decrease or increase to values determined by the setting of R3 and R6, respectively, the voltage detector circuit releases relay K to extend an external alarm.

Fuse Alarm

5.05 Any open fuse of this Power Board supplies resistance battery or causes a parallel-connected alarm-type fuse to open and supply resistance battery to operate relay K1 on circuit card A1. Contacts of relay K1, operated, furnish ground to light lamp FA. Additional contacts of relay K1 will actuate external office and CSACS alarms, if connected.

Rectifier Failure Alarm

5.06 The FLOTROL Rectifiers used with this Power Board are connected to supply ground and operate relay K2 on circuit card A1 in the event of a failure of one or more Rectifiers. Contacts of relay K2, operated, furnish ground to light lamp RFA. Additional contacts of relay K2 will actuate external office and CSACS alarms, if connected.

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REV NOTE		DESCRIPTION	PART NO	STOCKLIST LIST 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	8	A
		RELAY RACK 8'-0"x23"	4125-008	1	1	1	1	1	1	1						1	1						
		,8'-0"x19"	4125-011									1	1	1	1								
		,8'-0"x23"	2377-081								1												
		GROUND BAR	3427-584	1	1	1	1	1	1	1	1												
		GROUND STRIP KIT	4835-530	1	1	1	1	1	1	1													
		INSULATED STANDOFF	4133-036	1	1	1	1	1	1	1	1												
		TERMINATION PNL	4341-016		1	1		1	1	1													
		METER CONT & ALM PNL	4374-101	1	1	1	1	1	1	1													
		SHUNT MTG PNL	3532-256	1			1																
		INSULATOR	2458-569	1			1				2												
	2	LUG KIT, 8-2	4835-524																			8	
15	2	,14-4	4835-523	48	64	64	32	32	32		48												8
		,4-3/0	4835-526	7	1	1	7	1	1	1													
		,1/0-500MCM	4835-528	2			2																
		,600-1000MCM	4835-529		2	4		2	4	6	4												
		LUG, 600-1000MCM	2456-190							2													
20		,2-4/0	2456-150							4	4												
	5	FUSE PNL (4) 61-600A	4316-011							1													
	4	,(8) 0-30A	4317-008	6	8	8	4	4	4		6												1
	4	,(8) 31-60A	4317-009																			1	
		AMMETER, 0-200A	2925-328	1			1																
25		,0-400A	2925-332		1			1															
		,0-800A	2925-338			1			1	1													
30		SHUNT, 0-200A	2982-714	1			1																
		,0-400A	2982-717		1			1															
		,0-800A	2982-721			1			1	1													
35																							
		BUS BAR	3427-587							1													
			3427-586		1	1																	
			3631-512			1			1	1													
			3635-330		1	1		1	1	1													
40			3633-528		1			1															
			3476-102																			1	1
			3633-560	1			1																
			3427-585				1	1	1														
			3425-749								2												
45			3476-523	1																			
			3425-153							2													
			3637-520							1													
		BUS BAR COVER ASSY	4141-402	2	2	2	1	1	1	1	2												
		P.V.C. GRILLE	1828-701	12.5	12.5	12.5	6	6	6	6	12.5												
50																							
	3	SUPPORT BRKT	3633-333								2												
55		RECTIFIER, RL100F50	5451-019									1	2					1					
		,RHM100D50	5454-008											1	2				1				
		,RHM200D50	5472-012													1	2			1			
		,RHM400D50	5481-029																		1		
60		BAFFLE, 5 1/4"x23"	4133-022													1	1						
		,5 1/4"x19"	4133-021									1	1	1	1								
		BLANK PNL, 5-1/4"X23"	3533-106	6	4	4					9												
		,1-3/4"X23"	3531-106				1	1	1	1													
65		,12-1/4"X23"	3541-309							3													
		PANEL	3531-161								1												
		FUSE ALM REL & LAMP	4265-022								1												
70																							
		FUSE LINK, 125A	2484-635							2													
		,600A	2484-656							2													
75																							
80																							

SHOP / INST

X
X
X
X X
X X

MANUFACTURING NOTES

1. RECTIFIER DESIGNATIONS TO B IN 1/4" BLACK CHARACTERS: H STAMPING TO BE 3/16" CHARAC
2. MOUNT ALL DISTRUBUTION LUGS (INCLUDING THOSE FURNISHED A, WHEN SPECIFIED) BACK TO GROUND BAR SO AS TO ALLOW F ADDITIONS. (SEE SK A, B OR
3. LOCATE AND DRILL TWO HOLES I PANELS TO MOUNT BUS BAR SUP BRACKETS WHEN NECESSARY F ARRANGEMENT. (SEE SK F).
4. 0-30 AMP FUSE POSITIONS AR LUGS; 31-60 AMP WITH 8-2 G 0-30 AMP OR 31-60 AMP FUSE ISHED, ORDER AS REQUIRED.
5. FUSE POSITIONS F1 AND F2 A AMP FUSES AND 2-4/0 LUGS; F WITH 600 AMP FUSES AND 600 LUGS.
6. MODIFY FUSE PNLS 3A, 5A, 7 AND 13A MOUNTED IN LIST 8 SO THAT THE BUS BAR TERMINA EXTENDED TO THE OPPOSITE (LEF SIDE.

TABLE B

VIDAR TYPE POWER BOARD	LORAIN 5821-02
20024	L-7
40024	L-2
80024	L-8
20124	L-4 & 15
	L-4 & 16
	L-4 & 17
40124	L-5 & 15
	L-5 & 16
40324	L-5 & 17
80124	L-8 & 17
80001	L-7
80000	L-8
10011	L-9
10021	L-10
10013	L-11
10023	L-12
20013	L-13
20023	L-14
00400	L-18
ADDITIONAL FUSE PANEL	ADD LIST A OR B TO LIST 1 THRU 6 AND LIST 8

TABLE A

A EQUIPMENT (ENGINEERING INFORMATION)		B RATING	C LIST	D NO	E CIRCUIT & FIGURES EQUIPPED
COMMON EQUIPMENT, WIRING & ASSEMBLY FOR ONE 48 VOLT POWER BOARD (INCLUDES ONE 8'-0" X 23" REL RACK AND MULTIPLE 0-30 AMP FUSE PANELS).	200 AMP		1		
	400 AMP		2		
	800 AMP		3		
COMMON EQUIPMENT, WIRING & ASSEMBLY FOR ONE 48 VOLT POWER BOARD. (INCLUDES ONE 8'-0" X 23" REL RACK AND (4) 0-30 AMP FUSE PANELS WITH SPACE FOR ONE RECTIFIER) SEE LIST 15,16 OR 17.	200 AMP		4		
	400 AMP		5		
	800 AMP		6		
COMMON EQUIPMENT, WIRING & ASSEMBLY FOR ONE 48 VOLT POWER BOARD ARRANGED FOR REMOTE DISTRIBUTION.(INCLUDES ONE 8'-0"X23" REL RACK).	800 AMP		7		
REMOTE DISTRIBUTION BAY FOR USE WITH LIST 7. (INCLUDES ONE 8'-0" x 23" REL RACK AND (6) 0-30 AMP FUSE PANELS).			8		
SUPPLEMENTAL BAY (INCLUDES ONE 8'-0" x 19" REL RACK, VENTILATION BAFFLE AND ONE OR TWO 100 AMP RECTIFIERS).	ONE 1Ø RECT		9		
	TWO 1Ø RECT		10		
	ONE 3Ø RECT		11		
	TWO 3Ø RECT		12		
SUPPLEMENTAL BAY (INCLUDES ONE 8'-0" x 23" REL RACK, VENTILATION BAFFLE AND ONE OR TWO 200 AMP RECTIFIERS).	ONE 3Ø RECT		13		
	TWO 3Ø RECT		14		
RECTIFIER REQUIRED IN ADDITION TO LIST 4,5, OR 6.	1Ø, 100 AMP		15		
	3Ø, 100 AMP		16		
	3Ø, 200 AMP		17		
400 AMP, 3Ø RECTIFIER FOR USE WITH LIST 2, 3 OR 7. (FREE STANDING CABINET).			18		
ADDITIONAL DISTRIBUTION FUSE PANEL(8)31-60A POSITIONS WITH BUS LINK & (8) ASSOCIATED GROUND DISTRIBUTION LUGS			B		
ADDITIONAL DISTRIBUTION FUSE PANEL (8) 0-30A POSITIONS WITH BUS LINK & (8) ASSOCIATED GROUND DISTRIBUTION LUGS.			A		

SCHEMATIC INFORMATION S NUMBER	FIG	OPT

REVISIONS

ISS NO	CHG'D BY CHG SLIP NO.	DATE	DESCRIPTION
1	NEW		FEB 16 1979

ENGINEERING NOTES

51. EQUIPMENT TO BE ORDERED BY SPECIFICATION AND LIST NO. PER TABLE B.

52. 0-30 AND 31-60 AMP DISTRIBUTION FUSES ARE NOT PROVIDED, ORDER AS REQUIRED.

1846273

POWER SYSTEMS SPECIFICATIONS FOR 200-800 AMP 48 VOLT POWER BOARD

MODEL 1233V3

LORAIN PRODUCTS CORPORATION
LORAIN, OHIO
LORAIN PRODUCTS (CANADA) LTD., ST THOMAS, ONTARIO

DWG SIZE D

DESIGN	D. GURNACK	ISS 1
DRAWN BY	S. GASPER	DATE 9-1-78
CHECKED BY		DATE 9-5-78
APPROVED BY		DATE
APPROVED BY		DATE 10-30-78
RATING	STANDARD (VIDAR CORP)	

J-5821-027

SHEET 1 OF 2

PRINTED IN U.S.A.

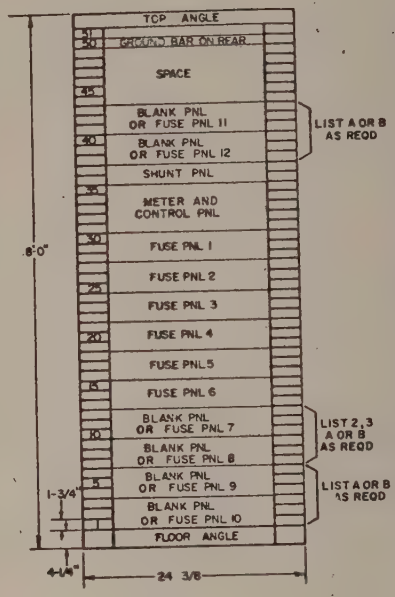


FIG 1
LIST 1, 2 & 3

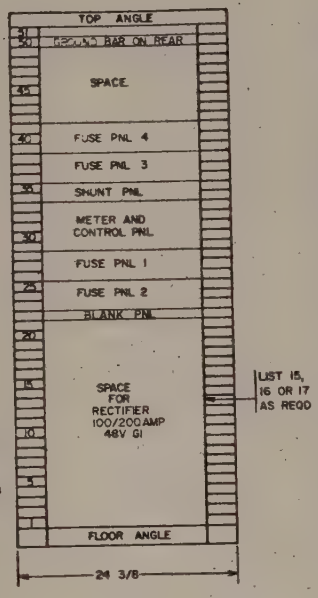


FIG 2
LIST 4, 5 & 6

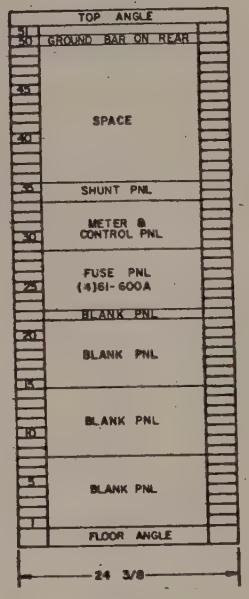
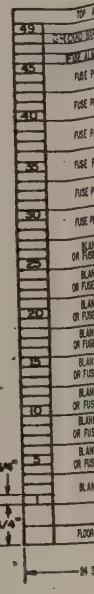
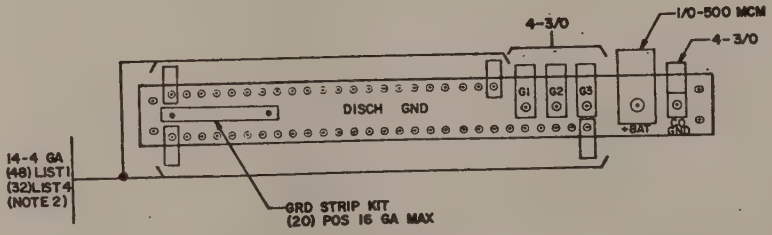
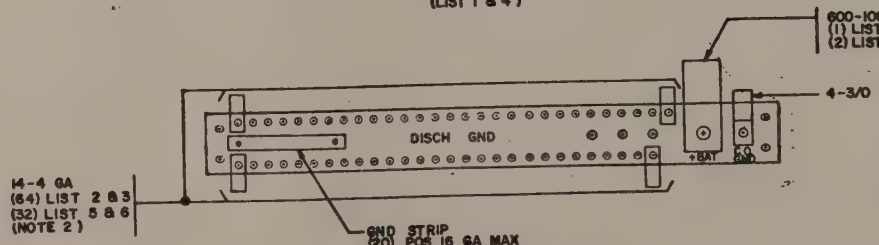


FIG 3
LIST 7

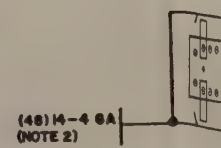




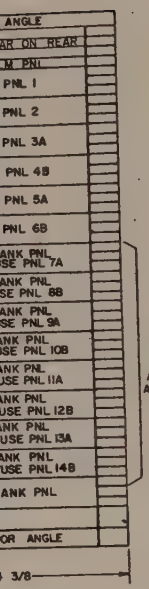
SK A
GROUND BAR ASSEMBLY
(LIST 1 & 4)



SK B
GROUND BAR ASSEMBLY
(LIST 2, 3, 5 & 6)



DRAWING ISSUE



LIST A OR B AS REQD

FIG 4
LIST 8
NOTE 6)

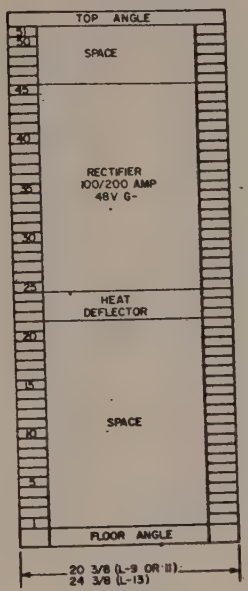


FIG 5
LIST 9, 11 OR 13

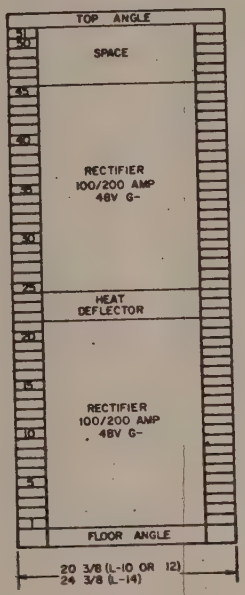
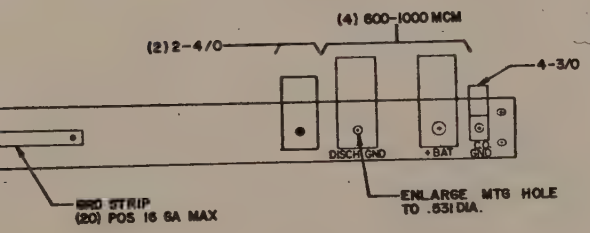
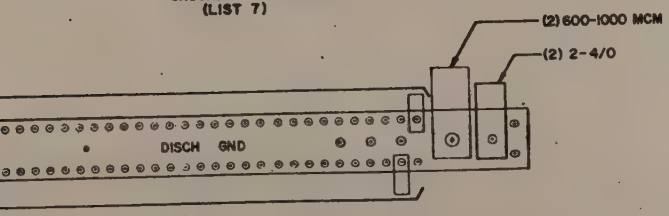


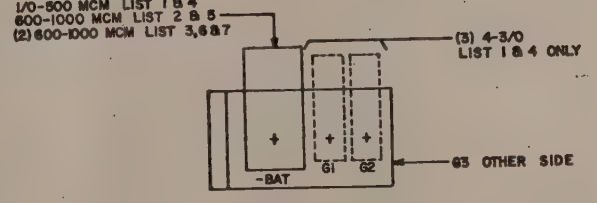
FIG 6
LIST 10, 12, OR 14



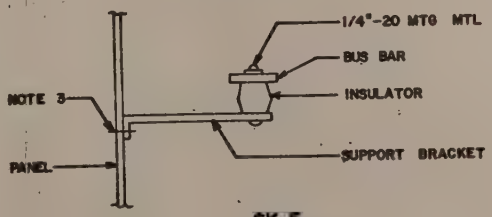
SK C
GROUND BAR ASSEMBLY
(LIST 7)



SK D
GROUND BAR ASSEMBLY
(LIST 8)



SK E
TERMINATION BUS BAR ASSEMBLY



SK F
BUS BAR SUPPORT MTG
(LIST 8)

ISSUE 1

MODEL 1233V3	J-5821-027
LORAIN PRODUCTS CORPORATION DWG SIZE D	SHEET 2 OF 2

PRINTED IN U.S.A.

SHEET INDEX

SHEET NO	CONTENTS
1.	SHEET INDEX CIRCUIT NOTES SUPPORTING INFORMATION OPTION INDEX INFORMATION NOTES APP FIG 1
2.	FIG 1 RECTIFIER FIG 2 CHARGE LEADS FIG 3 48V BATTERY FIG 4 DISTRIBUTION FUSES FIG 5 CONTROL FUSES FIG 6 ALARM CIRCUIT

OPTION INDEX

APP OR WRG	LOCATION

SUPPORTING INFORMATION

CATEGORY	NO
EQUIPMENT DRAWING	J-5821-027
WIRING DIAGRAMS	T-5821-027 T-4374-101 D311-912

INFORMATION NOTES

301 UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS.

302 APPARATUS FIGURE CODE NUMBERS IN PARENTHESES ARE LORAIN PRODUCTS STOCK NUMBERS.

303. ALL RELAYS ARE SHOWN RELEASED.

304. FIGURES AND SYMBOLS ARE DRAWN IN DETACHED CONTACT FORM WHERE AN OPEN CONTACT IS REPRESENTED BY A (X) THRU THE LINE AND A CLOSED CONTACT BY A (–). APP & ASSOCIATED CONTACTS HAVE THE SAME DESIGNATION.

305. TWO NUMBERS LISTED FOR A RELAY CONTACT DENOTES (2) SETS OF CONTACTS CONNECTED IN PARALLEL.

306. LEAD AND EQUIPMENT DESIGNATIONS FOLLOWED BY A DASH (–) INDICATE CKT AND EQUIPMENT NUMBERING: 1 FOR 1ST (FIGURE, CKT OR EQPT), 2 FOR 2ND ETC.

CIRCUIT NOTES

101.

FEATURE OR OPTION	PROVIDE		
	FIG	APP OR WRG	QUANTITY
48V RECTIFIER	1		AS REQD
48V PLANT	2,4,5, 6		1 PER PLANT
DISTRIBUTION FUSES	(4)		NOTE 102

102. DISTRIBUTION FUSES SHOWN ARE TYPICAL, QUANITITY AND CAPACITY SHALL BE FURN IN ACCORDANCE WITH JOB INFORMATION. ONE ALARM RESISTOR WILL BE FURN PER DISTRIBUTION PANEL.

103. RECT TERMS SHOWN ARE NOT PROVIDED ON ALL MODELS, SEE ASSOC POWER DATA SHEET OR 48 VOLT RECTIFIER CONNECTING DRAWING 0311-916.

104. REFER TO T-5821-027 FOR CABLING INFORMATION AND WIRE CALCULATION.

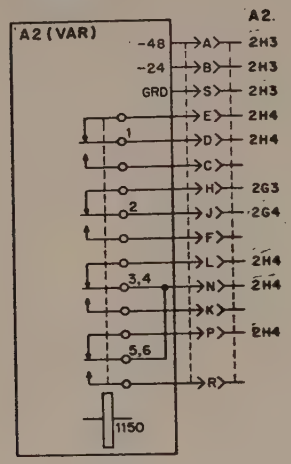
105. TRANSISTOR VOLTAGE RELAY LIMITS FURNISHED ARE BASED ON A FLOAT VOLTAGE OF 2.17 AND EQUALIZE VOLTAGES UP TO 2.30 VOLTS PER CELL UNLESS OTHERWISE SPECIFIED. SHOULD READJUSTMENT BE REQUIRED SEE ASSOCIATED FORM 1955 FOR DETAILED INSTRUCTIONS.

106. ON 200 AMP PLANTS THE RECTIFIERS ARE CONNECTED AT THE POWER BOARD. ON 400 AND 800 AMP PLANTS THEY ARE CONNECTED AT THE BATTERY.

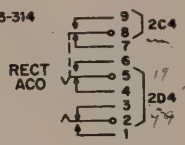
107. PROVIDE OFFICE ALARM AND CSACS ALARM CONNECTIONS IN ACCORDANCE WITH JOB REQUIREMENTS. (SEE T-5821-027, TABLE F)

APP FIG 1

VOLTAGE RELAY
(4863-027)



KEY
2523-314



KEYTOP
2523-314

POWER SYSTEMS CHARGE & DISCHARGE CIRCUIT 200-800 AMP -48 VOLT POWER BOARD MODEL 1233V3	DRAWN BY E.L. GARTON	DATE 10-27-78
	CHECKED BY	DATE 10-28-78
	APPROVED BY	DATE
	APPROVED BY	DATE 10-30-78
	RATING STANDARD (VIDAR CORP)	
	SD-5821-027	
LORAIN PRODUCTS CORPORATION LORAIN, OHIO LORAIN PRODUCTS (CANADA) LTD., ST. THOMAS, ONTARIO	DWG SIZE D	2 SHEETS PRINTED IN U.S.A.
		SHEET 1

ISSUE 1

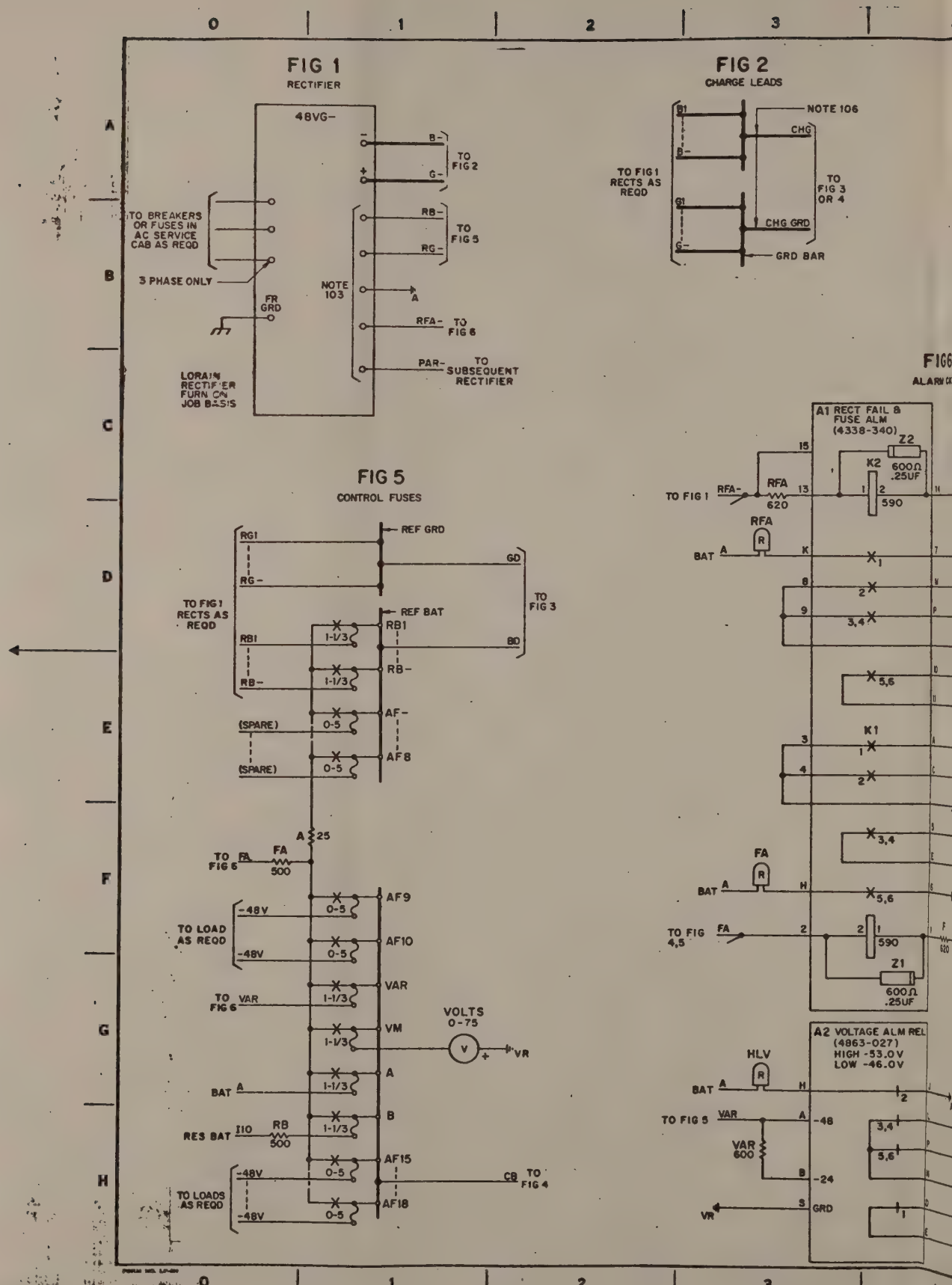


FIG 1
RECTIFIER
48VG-
B-
G-
TO FIG 2
RB-
RG-
TO FIG 5
TO BREAKERS OR FUSES IN AC SERVICE CAB AS REQD
3 PHASE ONLY
FR GRD
NOTE 103
A
RFA-
TO FIG 6
PAR-
TO SUBSEQUENT RECTIFIER
LORAIN RECTIFIER FURN ON JOB BASIS
FIG 2
CHARGE LEADS
B1
B-
NOTE 106
CHG
TO FIG1 RECTS AS REQD
TO FIG 3 OR 4
G1
CHG GRD
G-
GRD BAR
FIG 5
CONTROL FUSES
RG1
RG-
REF GRD
GO
TO FIG 3
TO FIG1 RECTS AS REQD
REF BAT
RB1
RBI
1-1/3
RB-
(SPARE)
0-5
AF-
AF8
A 25
TO FIG 6
FA
FA 500
AF9
-48V
TO LOAD AS REQD
AF10
VAR
TO FIG 6
VM
VOLTS 0-75
VR
A
BAT
B
RES BAT
110
RB 500
AF15
CB
TO FIG 4
TO LOADS AS REQD
AF18
A1 RECT FAIL & FUSE ALM (4338-340)
Z2
600Ω .25UF
K2
590
TO FIG 1
RFA-
RFA 620
BAT
K1
FA
TO FIG 4,5
Z1
A2 VOLTAGE ALM REL (4863-027)
HIGH -53.0V
LOW -46.0V
HLV
TO FIG 5
VAR
VAR 600
-48
-24
GRD

FIG 3
48V BATTERY

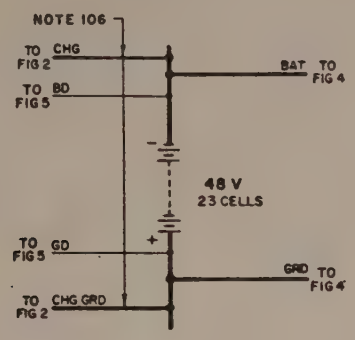
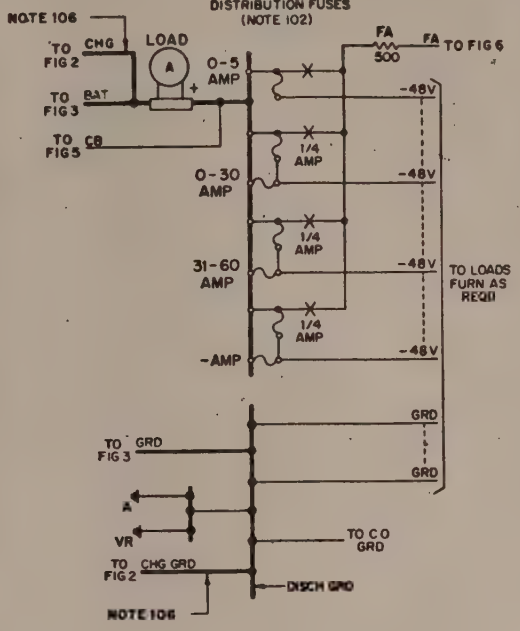
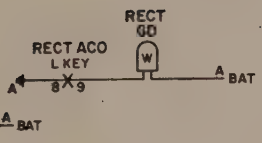
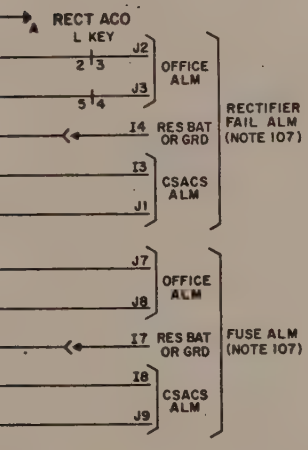
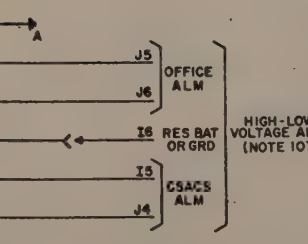


FIG 4
DISTRIBUTION FUSES (NOTE 102)









DRAWING ISSUE 1 ELG 30

ISSUE 1

MODEL 1233V3	SD-5821-027
LORAIN PRODUCTS CORPORATION DWG SIZE D	SHEET 2 OF 2

PRINTED IN U.S.A.

TABLE A

SD-T DWG CROSS REFERENCE & FIGURE LOCATION TABLE

ITEMS IN PARENTHESES ARE FOR INFORMATION ONLY AND ARE NOT TO BE RECORDED ON JOB WIRING LIST DRAWING

LINE	SD-5821-027 SHEET	SD-5821-027 FIG	SD-5821-027 OPT	T-5821-027 FIG	T-5821-027 WRG	T-5821-027 APP	T-5821-027 SHEET	REMARKS
1	2	4,5,6		1			2	
	2	1		2			2	
	2	2		3			2	
	2	3		4			2	
5	2	4		5			2	
	2	4		6			2	
	2	4		7			2	
10								
15								
20								

TABLE B

RECORD OF FIGURES, APPARATUS AND WIRING CHANGES

CHANGED ON ISSUE	IF OFFICE RECORDS: SPECIFY	IF OFFICE RECORDS: DO NOT SPECIFY	THIS OPTION WAS FURNISHED	SEE ENG NOTE	RATING: STD	RATING: ABM	RATING:

TABLE D

CALCULATION OF VARIABLE LEAD SIZES

LEAD	LOOP DROP (VOLTS)	CALCULATE FOR
C	1.0	RATED CHARGE CAPACITY OF RECTIFIER
D	0.5	MAX DISCHARGE CAPACITY OF PLANT

TABLE C

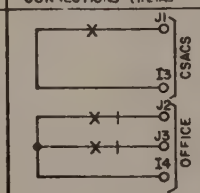
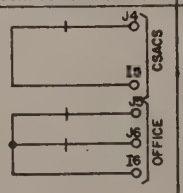
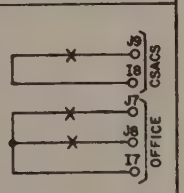
FEATURE TABLE

ITEM		FEATURE	SPECIFY T-5821-027 FIG	QUAN	WRG	APP	SEE NOTE	REMARKS
1		METER, CONTROL AND ALARM	1	1				
2		RECTIFIER	2	AS REQD			53,57	
3		CHARGE LEADS	3	1			58	ONLY PROVIDED ON 200A PLANTS
4		48VOLT BATTERY	4					NOT PROVIDED FURN ON JOB BASIS
5		DISCHARGE SHUNT	5	1				
6		MAIN FUSE PNL (4) 600AMP FUSES	6	1				LIST 7 ONLY
7		0-30 OR 31-60AMP DISTRIBUTION FUSES	7	AS REQD				
8								

TABLE F

ALARM CONNECTIONS (NOTE 55)

ALARM TERMINATIONS WILL ACCOMMODATE UP TO 3 ALM BAT OR GND CKTS OR 2 CLOSED LOOP CKTS FOR EACH ALM FUNCTION. PROVIDE ALM CONNECTIONS IN ACCORDANCE WITH ALM CKT REQUIREMENTS.

ALM FUNCTION	TERMINAL CONNECTIONS (T.B.A)	ALM FUNCTION	TERMINAL CONNECTIONS (T.B.A)	ALM FUNCTION	TERMINAL CONNECTIONS (T.B.A)
RECTIFIER FAIL ALARM		HIGH-LOW VOLTAGE ALARM		FUSE ALARM	

DISCHARGE CAPACITY OF PLANT, AMPERES	LEAD
200	
400	
800	

ENGINEERING NOTES

51. THIS DRAWING AGREES WITH ISSUE 1
SD-5821-027 ISSUE 1

52. EQUIPMENT ARRANGEMENT PER J-5821-027

53. A.C. SERVICE EQUIPMENT NOT PROVIDED; FURN AS REQD

54. BATTERIES ARE NOT PROVIDED; FURN AS REQD.

55. INSTRUCT INSTALLER TO MAKE ALARM CIRCUIT CONNECTIONS PER OFFICE REQUIREMENTS AND TABLE F.

56. ASSOCIATED DRAWINGS:
0311-912 DISTRIBUTION FUSE WIRING
T-4374-101 METER CONTROL AND ALARM PNL WIRING

57. RECTIFIER CONNECTIONS SHOWN ARE TYPICAL AND NOT NECESSARILY PROVIDED ON ALL MODELS. SEE ASSOCIATED POWER DATA SHEET OR 48 VOLT RECTIFIER DWG 0311-916 FOR REQD TERMINATIONS, WIRE AND FUSE SIZES FOR RECTIFIER MODEL BEING USED.

58. RECTIFIER TERMINATIONS ARE PROVIDED ON THE POWER BOARD FOR 200 AMP PLANTS. FOR 400 AND 800 AMP PLANTS INSTRUCT INSTALLER TO CONNECT RECTIFIERS AT THE BATTERY.

MANUFACTURING NOTES

SHOP	INST	
X		1. COLORED LEADS NOT OTHERWISE SPECIFIED TO BE 20 GA
X		2. BI-TERMINAL NEAREST PANEL.
X	X	3. Ø - LEADS RUN BY INSTALLER.
X		4. G - LEADS INSULATED WITH SLEEVING.
X	X	5. DO NOT CUT CALIBRATED SHUNT LEADS. FOLD UP EXCESS AND TIE WITH TWINE
X	X	6. LEADS SHOWN TERMINATED IN COMPONENTS WITHOUT TERMINALS ARE FURNISHED WITH COMPONENTS
X		7. D-WIRING NOT INCLUDED IN LOCAL CABLE FORM BUT RUN AS SEPARATE LEADS.
X	X	8. Δ - LEADS RUN BY SHOP WHEN ASSOCIATED EQUIPMENT IS SHOP MOUNTED IN SAME BAY, OTHERWISE RUN BY INSTALLER.
X	X	9. -AMP DENOTES APPARATUS WITH VARIABLE AMPERE RATING, TO BE ORDERED ON A JOB BASIS.
X	X	10. TERM ON CARD RECEPTACLE SHOWN SOLID DENOTES LOCATION OF POLARIZING KEY.
	X	11. WHEN REQUIRED, TBA TERMINALS I3 THRU I8 CAN BE STRAPPED TO TERM II FOR GROUND TO ALMS OR TERM I 10 FOR RESISTANCE BAT TO ALMS.
X	X	12. SEE JOB INFORMATION FOR PWR BD & ASSCC RECT OPTIONS.
X	X	13. FOR RECTIFIER WIRING SEE ASSOCIATED PWR DATA SHEET OR 48 VOLT RECTIFIER CONNECTING DRAWING 0311-916.
X		14. SEE J-5821-027 AND ASSOCIATED ASSEMBLY DRAWINGS FOR PART NUMBERS.
X		15. Ⓐ LEADS TO BE 3/0 FOR 200 AMP PLANT, BUSBAR FOR 400 AND 800 AMP PLANTS AND CABLE AS REQD FOR SERARATE FUSE PANELS.

				1	30X

TABLE E

TTERY LEADS

D SIZE Ⓓ	MAX LOOP LENGTH BAT TO PWR BD Ⓓ	
MCM	79'	
MCM	112'	
50 MCM	56'	
00 MCM	67'	
50 MCM	79'	
00 MCM	90'	
00 MCM	112'	
00 MCM	67'	
00 MCM	78'	
50 MCM	84'	

* LEAD SIZES SHOWN IN TABLE E ARE BASED ON 1978 NATIONAL ELECTRIC CODE TABLE, 310-16, FOR RH, THW AND EQUIV TYPE CONDUCTORS AT 30°C (86°F) AMBIENT.

1846273

ISSUE 1

POWER SYSTEMS
CHARGE & DISCHARGE CIRCUIT
200-800 AMP 48 VOLT
POWER BOARD
MODEL 1233V3

DRAWN BY E. L. GARTON DATE 10-20-78
CHECKED BY Bill Barnett DATE 10-24-78
APPROVED BY DATE
APPROVED BY DATE 10-30-78
RAT NO. STANDARD (VIDAR CORP)

T-5821-027

LORAIN PRODUCTS CORPORATION
LORAIN, OHIO
LORAIN PRODUCTS (CANADA) LTD., ST THOMAS, ONTARIO

DWG SIZE D

2 SHEETS

SHEET 1

PRINTED IN U.S.A.

FIG 1
METER, CONTROL AND ALARM

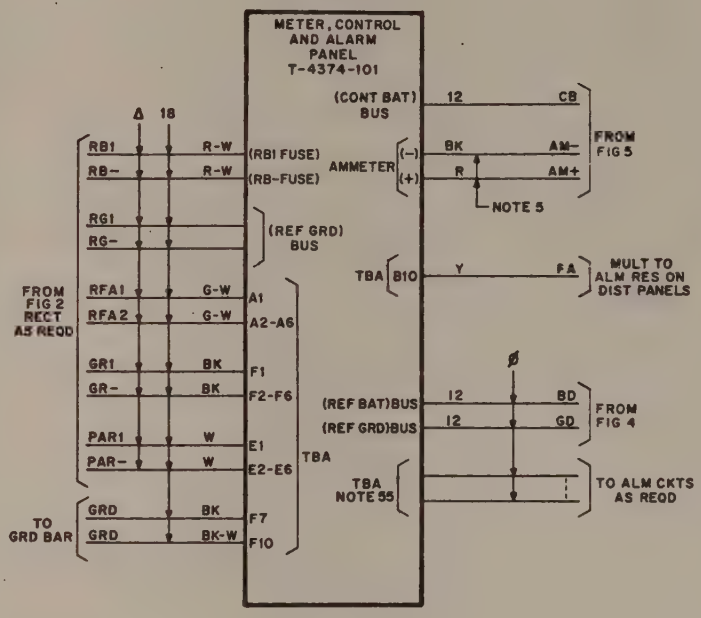


FIG 2
RECTIFIER

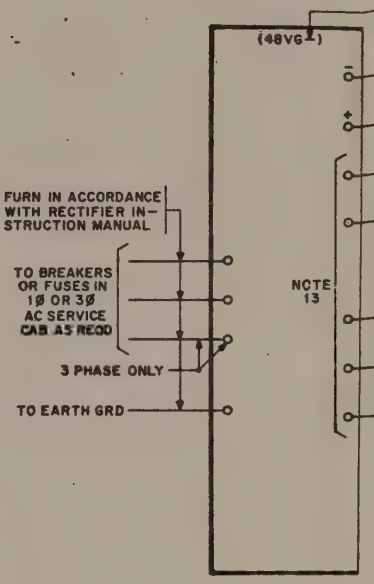

(48VG)
FURN IN ACCORDANCE WITH RECTIFIER INSTRUCTION MANUAL
TO BREAKERS OR FUSES IN 1Ø OR 3Ø AC SERVICE CAB AS REQD
3 PHASE ONLY
TO EARTH GRD
NOTE 13

FIG 5
DISCHARGE SHUNT

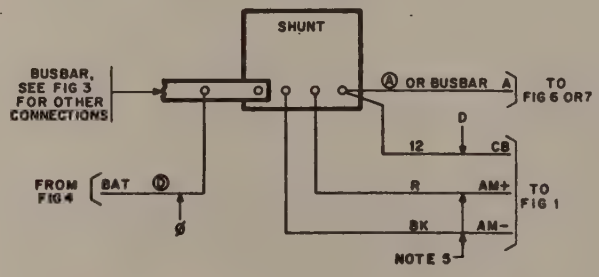
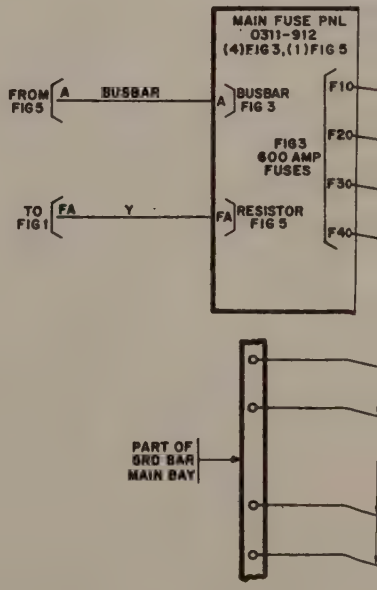


FIG 6
MAIN FUSE PNL (4)600 AMP FUSES (LIST 7 ONLY)



1 FOR 1ST RECT
2 FOR 2ND, ETC

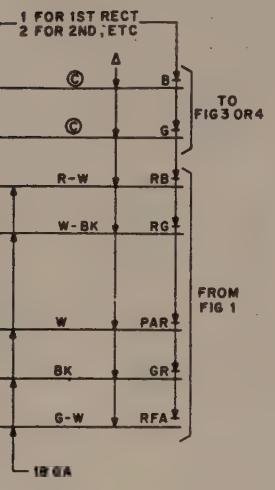


FIG 3
CHARGE LEADS

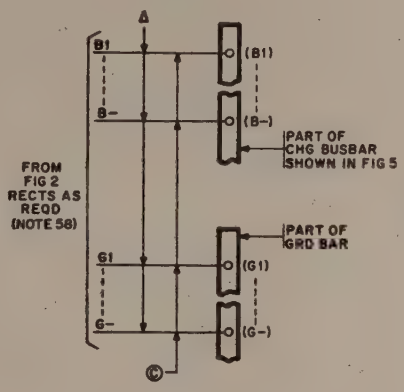


FIG 4
48V BATTERY

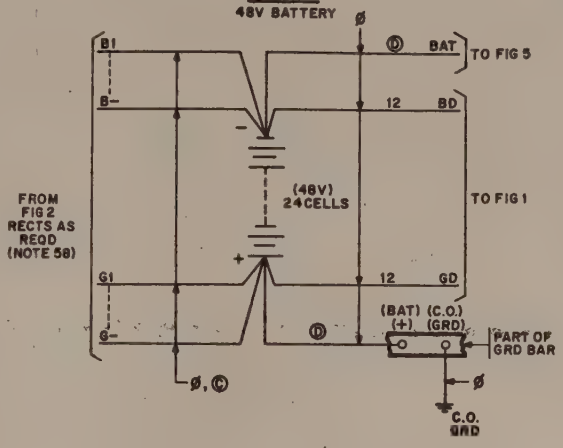
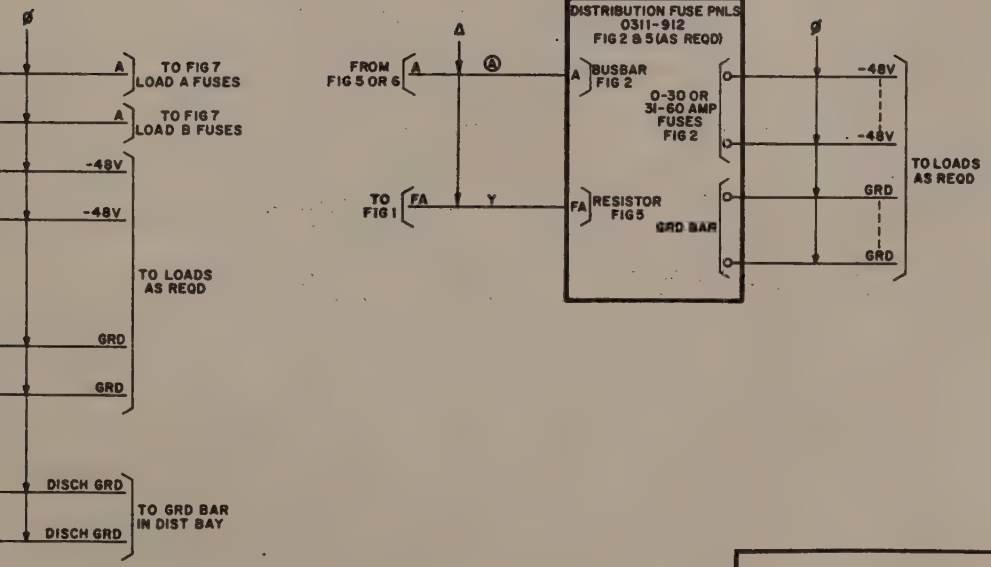
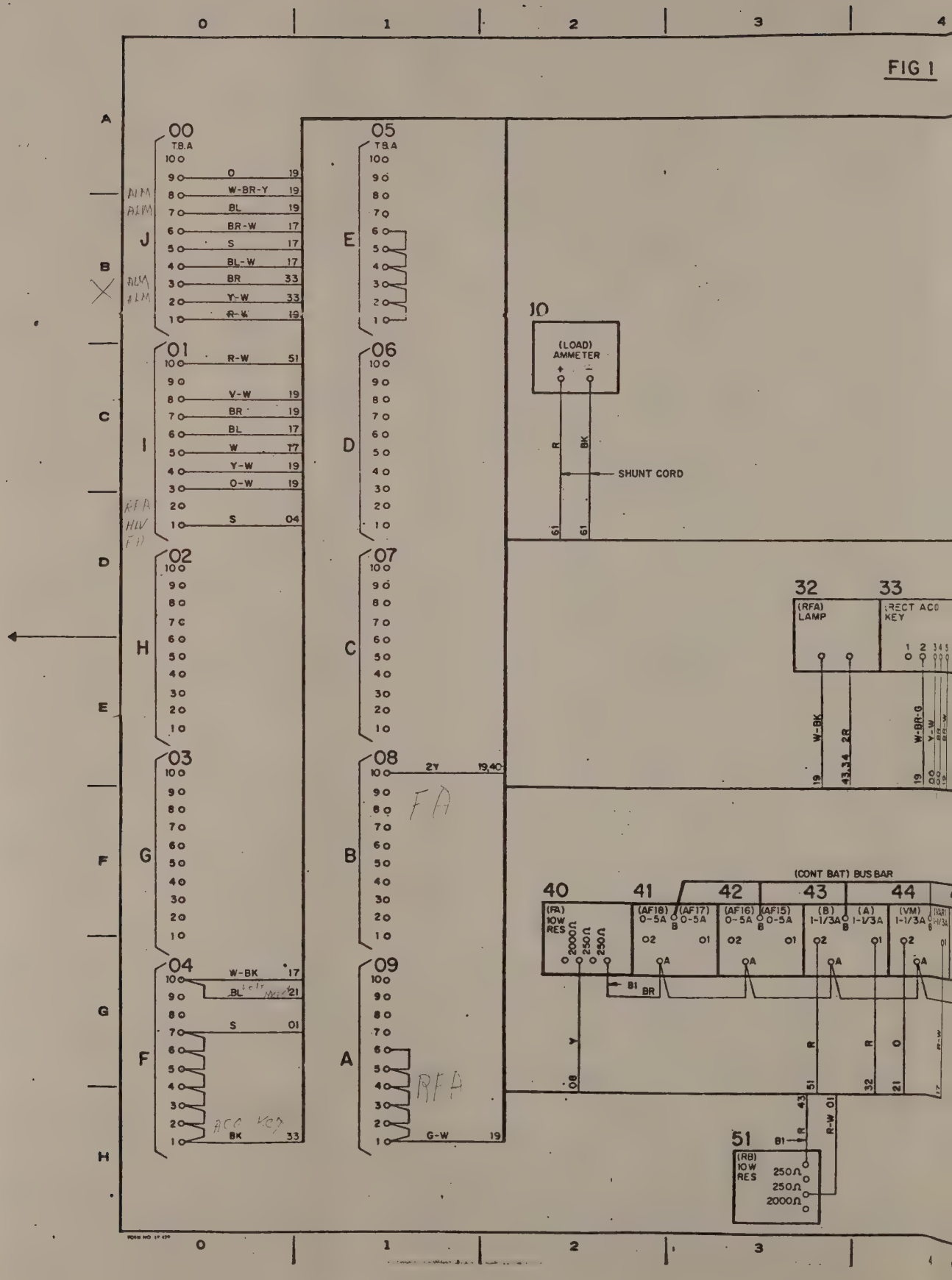


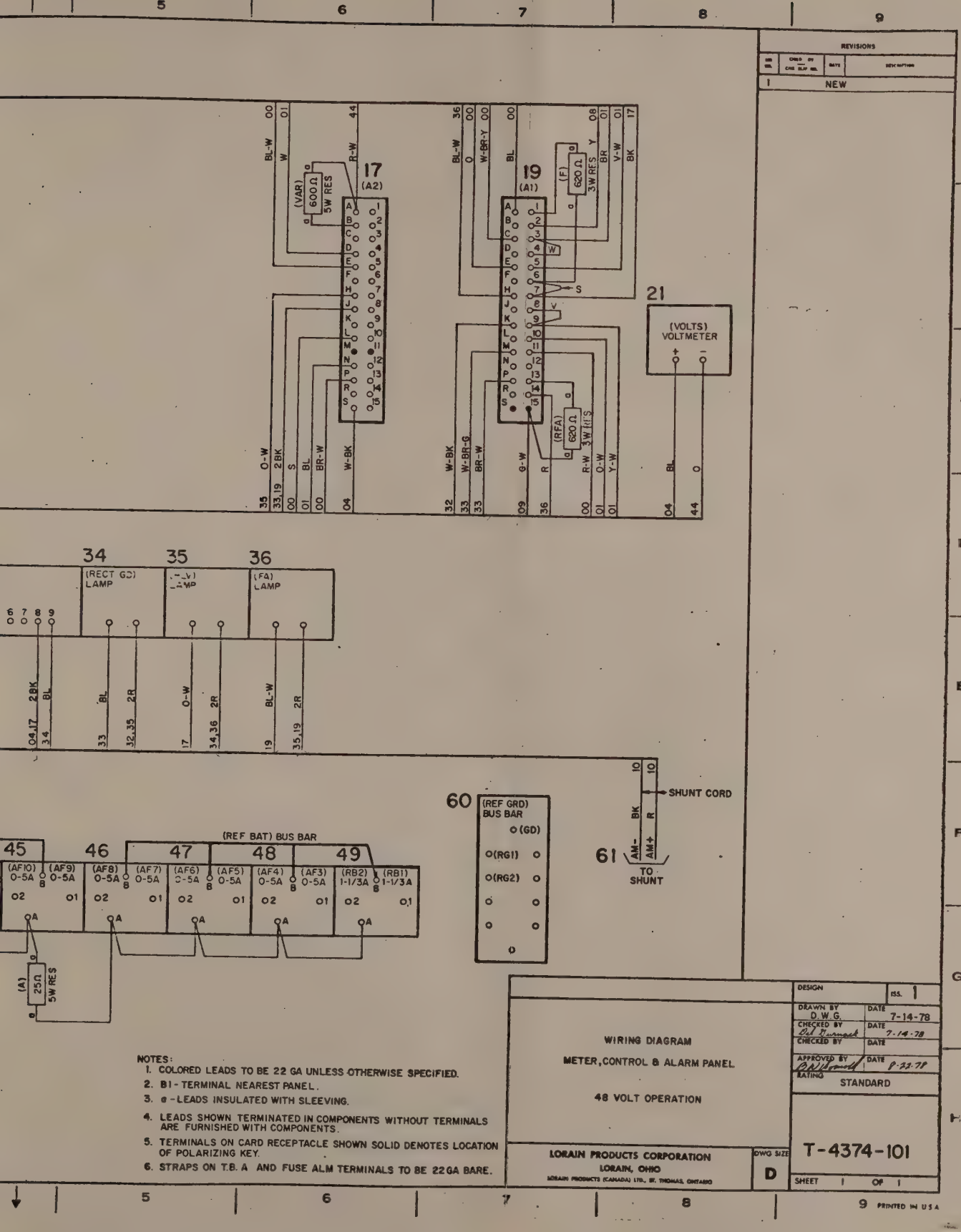
FIG 7
0-30 OR 31-60 AMP DISTRIBUTION FUSES


TO FIG 7 LOAD A FUSES
TO FIG 7 LOAD B FUSES
TO LOADS AS REQD
TO GRD BAR IN DIST BAY
DISCH GRD
FROM FIG 5 OR 6
TO FIG 1
DISTRIBUTION FUSE PNLS 0311-912 FIG 2 & 5 (AS REQD)
BUSBAR FIG 2
0-30 OR 31-60 AMP FUSES FIG 2
RESISTOR FIG 5
GRD BAR
-48V
GRD
TO LOADS AS REQD

MODEL 1233V3	T-5821-027	
LORAIN PRODUCTS CORPORATION	DWG SIZE D	SHEET 2 OF 2
		PRINTED IN U.S.A.

FIG 1


00
T.B.A
J
O 19
W-BR-Y 19
BL 19
BR-W 17
S 17
BL-W 17
BR 33
Y-W 33
R-W 19
01
I
R-W 51
V-W 19
BR 19
BL 17
W 17
Y-W 19
O-W 19
S 04
02
H
03
G
04
F
W-BK 17
S 01
BK 33
05
T.B.A
E
06
D
07
C
08
2Y 19,40
B
09
A
G-W 19
10
(LOAD) AMMETER
+
−
R
BK
SHUNT CORD
61
61
32
(RFA) LAMP
33
DIRECT ACC KEY
W-BK
19
43,34 28
W-BR-G
Y-W
R-W
19
(CONT BAT) BUS BAR
40
(FA) 10W RES
2000Ω
250Ω
250Ω
41
(AF18) 0-5A
(AF17) 0-5A
42
(AF16) 0-5A
(AF15) 0-5A
43
(B) 1-1/3A
(A) 1-1/3A
44
(VM) 1-1/3A
02
01
A
B
B1
BR
Y
08
R
51
R
32
O
21
R-W
17
43
R
R-W 01
51
B1
(RB) 10W RES
250Ω
250Ω
2000Ω



NOTES:

1. COLORED LEADS TO BE 22 GA UNLESS OTHERWISE SPECIFIED.
2. B1 - TERMINAL NEAREST PANEL.
3. ø - LEADS INSULATED WITH SLEEVING.
4. LEADS SHOWN TERMINATED IN COMPONENTS WITHOUT TERMINALS ARE FURNISHED WITH COMPONENTS.
5. TERMINALS ON CARD RECEPTACLE SHOWN SOLID DENOTES LOCATION OF POLARIZING KEY.
6. STRAPS ON T.B. A AND FUSE ALM TERMINALS TO BE 22 GA BARE.

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CPS—VAR
VOLTAGE ALARM RELAY

COMPONENT LIST

DIODE

DESIG	CODE
CR1	(2635-481) 8.2 V, 0.4W, ZENER
CR2	(2811-303)
(2) CR3A, CR3B	(2836-212) 12V, 1W, ZENER
(2) CR4, CR5	(2811-204)

RELAY

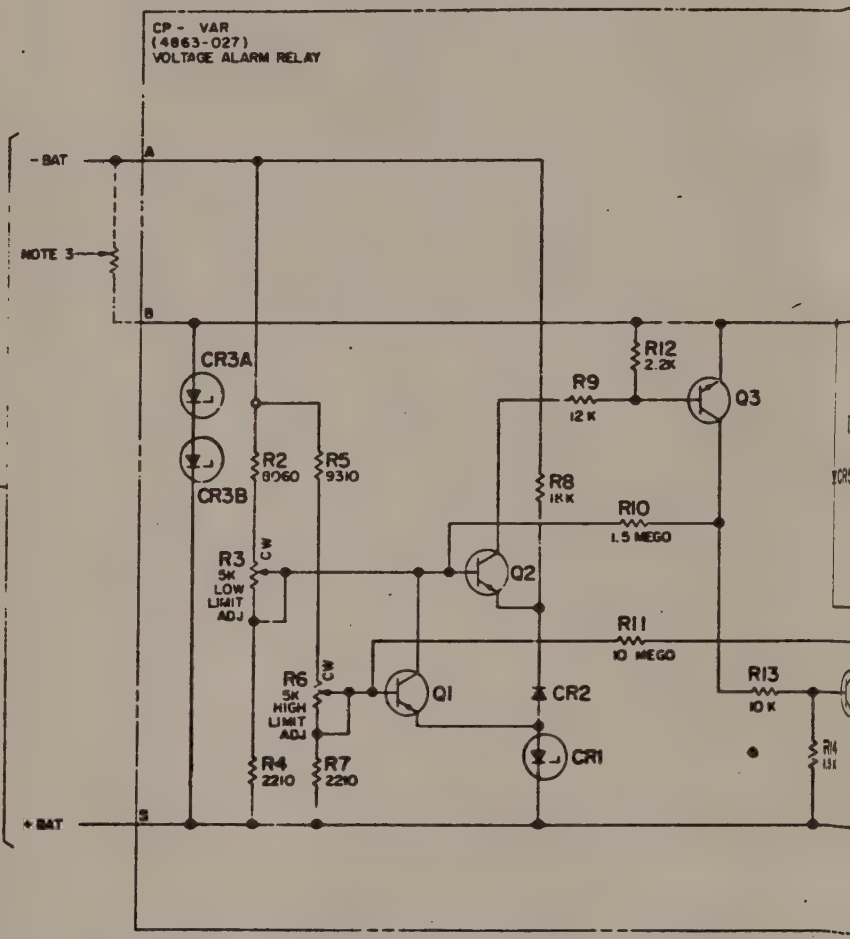
DESIG	CODE
K	(2543-422) 1150 OHM

RESISTOR

DESIG	CODE
R2	(2635-668) 8060 OHM, 1W 1%
(2) R3, R6	(2683-076) 5K, POTENTIOMETER
(2) R4, R7	(2635-641) 2210 OHM, 1W, 1%
R5	(2635-671) 9310 OHM, 1W, 1%
R8	(2615-293) 18K, 1/2W
R9	(2615-289) 12K, 1/2W
R10	(2615-339) 1.5 MEGO, 1/2W
R11	(2615-359) 10 MEGO, 1/2W
R12	(2615-271) 2.2K, 1/2W
R13	(2615-287) 10K, 1/2W
R14	(2615-267) 1.5K, 1/2W
R15	(2615-295) 22K, 1/2W

TRANSISTOR

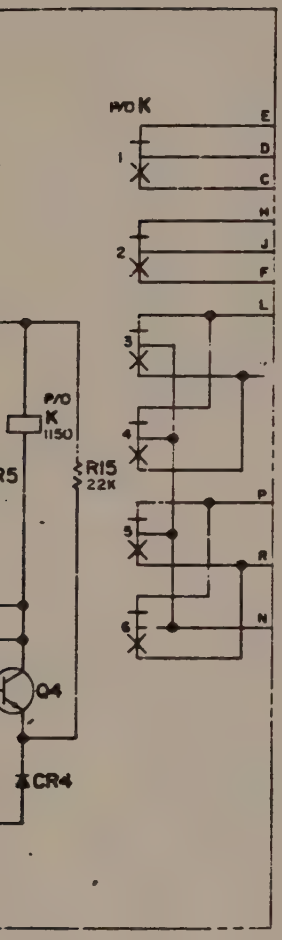
DESIG	CODE
(2) Q1, Q2	(2847-098)
Q3	(2847-096)
Q4	(2847-100)



REVISIONS			
5	1834307		REDRAWN, WAS SD-1866-03, ISS 4.
6	1834580	8 9	CORRECTED FUNCTIONAL DESIGNATION.

MANUFACTURING REFERENCES

CATEGORY	NUMBER
ASSEMBLY DRAWING	4863-027
CONNECTOR ON FRAME	3876-319



SYMBOL

SHOWN IN DETAIL IN FS

NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS AND CAPACITANCE VALUES ARE IN MICROFARADS.
2. CODES WITHIN PARENTHESES AS (2835-481) REPRESENT LPC PART NUMBERS.
3. RESISTOR R1 (2651-879) 600 OHM, 5W SHOWN WITH DOTTED LINE IS NOT SUPPLIED AS PART OF THIS ASSY.
4. PROVIDE 1-1/3 AMP FUSE IN EITHER -BAT LEAD FOR POSITIVE GROUND SYSTEMS OR +BAT LEAD FOR NEGATIVE GROUND SYSTEMS.

FORMERLY SD-1866-03

DESIGN | ISS 6

DRAWN BY WEARSCH DATE 5-27-65
CHECKED BY D GURNACK DATE 5-28-65
APPROVED BY G.J VASEK DATE 5-28-65
APPROVED BY DATE

RATING STANDARD

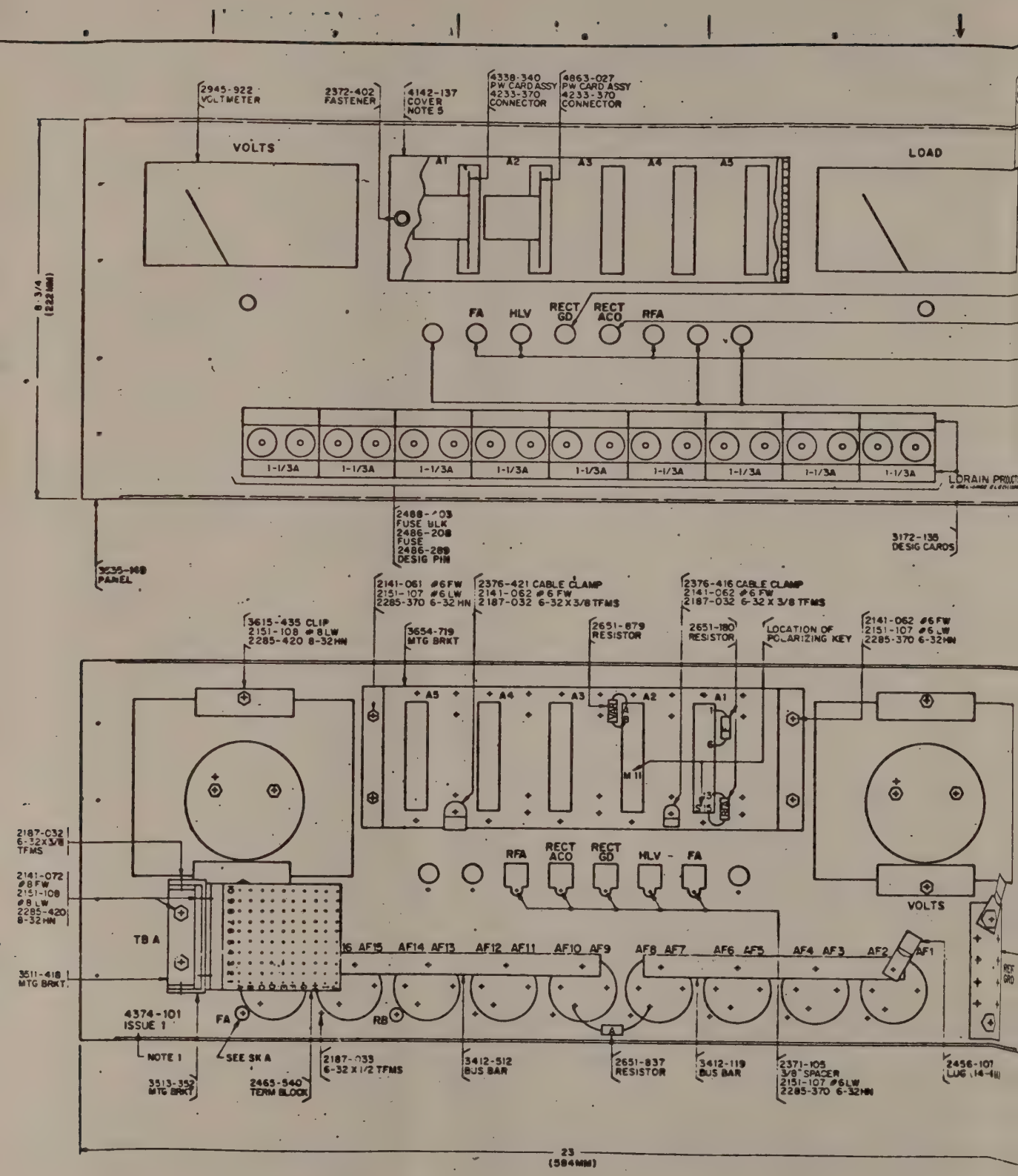
VOLTAGE ALARM RELAY FOR USE IN 48 VOLT POWER BOARDS (HIGH AND LOW ALM)

SD-4863-027

LORAIN PRODUCTS CORPORATION
LORAIN, OHIO

DWG SIZE D

SHEET 1 OF 1


2945-922 VOLTMETER
2372-402 FASTENER
4142-137 COVER NOTE 5
4338-340 PW CARD ASSY 4233-370 CONNECTOR
4863-027 PW CARD ASSY 4233-370 CONNECTOR
VOLTS
LOAD
A1
A2
A3
A4
A5
8-3/4 (222MM)
FA
HLV
RECT GD
RECT ACO
RFA
1-1/3A
LORAIN PRODUCTS
2488-103 FUSE BLK 2486-208 FUSE 2486-289 DESIG PIN
3172-138 DESIG CARDS
3238-148 PANEL
2141-061 #6FW 2151-107 #6LW 2285-370 6-32HN
2376-421 CABLE CLAMP 2141-062 #6FW 2187-032 6-32X3/8TFMS
2376-416 CABLE CLAMP 2141-062 #6FW 2187-032 6-32X3/8TFMS
3615-435 CLIP 2151-108 #8LW 2285-420 8-32HN
3654-719 MTG BRKT
2651-879 RESISTOR
2651-180 RESISTOR
LOCATION OF POLARIZING KEY
2141-062 #6FW 2151-107 #6LW 2285-370 6-32HN
M11
RFA
RECT ACO
RECT GD
HLV
FA
VOLTS
2187-032 6-32X3/8 TFMS
2141-072 #8FW 2151-108 #8LW 2285-420 8-32HN
TB A
AF16 AF15 AF14 AF13 AF12 AF11 AF10 AF9 AF8 AF7 AF6 AF5 AF4 AF3 AF2 AF1
3511-418 MTG BRKT
4374-101 ISSUE 1
FA
RB
NOTE 1
SEE SK A
3513-352 MTG BRKT
2465-540 TERM BLOCK
2187-033 6-32 X 1/2 TFMS
3412-512 BUS BAR
2651-837 RESISTOR
3412-119 BUS BAR
2371-105 3/8" SPACER 2151-107 #6LW 2285-370 6-32HN
2456-107 LUG (14-4)
23 (584MM)

SHOP	INST	MANUFACTURING NOTES
X		1. STAMP ISSUE NO AND LAST DIGITS OF ASSY NO. IN 3/16" CHARACTERS AS INDICATED.
X	X	2. AMMETER FURNISHED WITH POWER BOARD ACCORDING TO CAPACITY REQUIRED.
X		3 REMOVE LAMP & KEY DESIGNATIONS NOT APPLICABLE TO THIS ASSEMBLY.
X		4. CONNECT WIRE HARNESS 4948-701 PER T-4374-101.
X		5 PLACE POWER SYSTEM LABEL (3184-347) ON INSIDE OF COVER AND FILL IN INFORMATION AS REQUIRED, DURING FINAL TEST.

REVISIONS			
NO	ORDER NO.	DATE	DESCRIPTION
1			NEW

MMETER
OTE 2

2584-005LS
2581-213 LP
2584-618 LC

2523-314 KEY

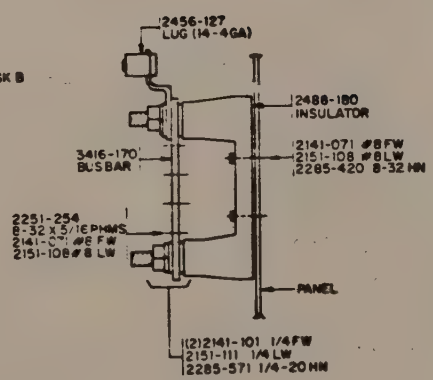
2584-005 LS
2581-213 LP
2584-616 LC

2375-636
PLUG BUTTON
NOTE 3

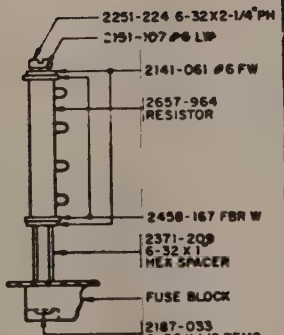
CTS 1

SEE SK B

REF
GRD



SK B
REF GRD
BUS BAR MTG



SK A
(FA) OR (RE)
RESISTOR MTG

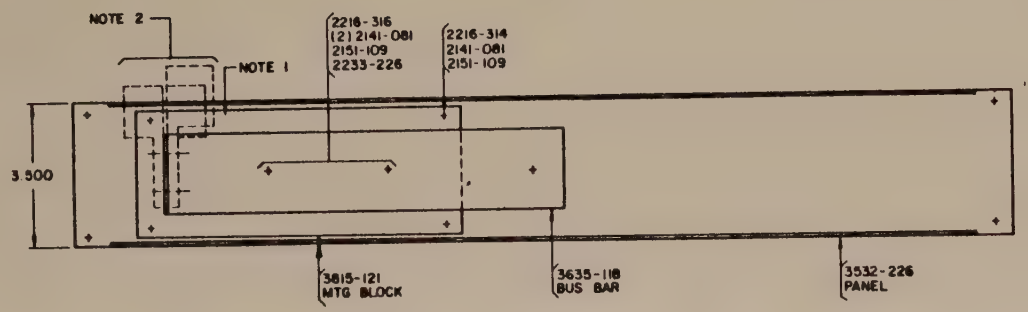
FIRST USED ON	NEXT ASSY		DWG NO
	MODEL NO	1231A2, 1233A2	D

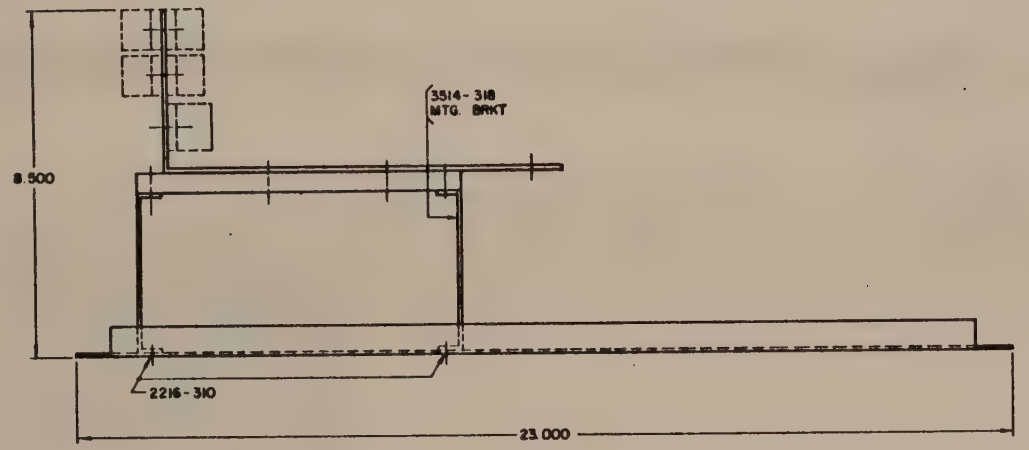
LORAIN PRODUCTS CORPORATION
LORAIN, OHIO

ASSEMBLY
METER, CONTROL & ALARM PANEL
48V OPERATION

	DWG	7-19-78
MATERIAL		DO NOT SCALE
		4374-101
		SHEET 1 OF 1

REVISIONS			
2	1834162		REDRAWN. 3532-226 WAS 3532-112 (MOD)





MANUFACTURING NOTES:

1. STAMP PANEL ASSEMBLY NO. IN 0.187 CHARACTERS IN POSITION SHOWN.
2. TERM LUGS ARE NOT PROVIDED AND SHALL BE FURNISHED PER JOB CONDITION OR FINAL ASSEMBLY DRAWING.

ENGINEERING NOTES:

51. SPECIFY CABLE SIZE AND QUANITY OF BTRY AND RECT TERMINALS.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ±1/32 DECIMALS .XX ±.01 .XXX ±.005 ANGLES ±1°	SIZE C

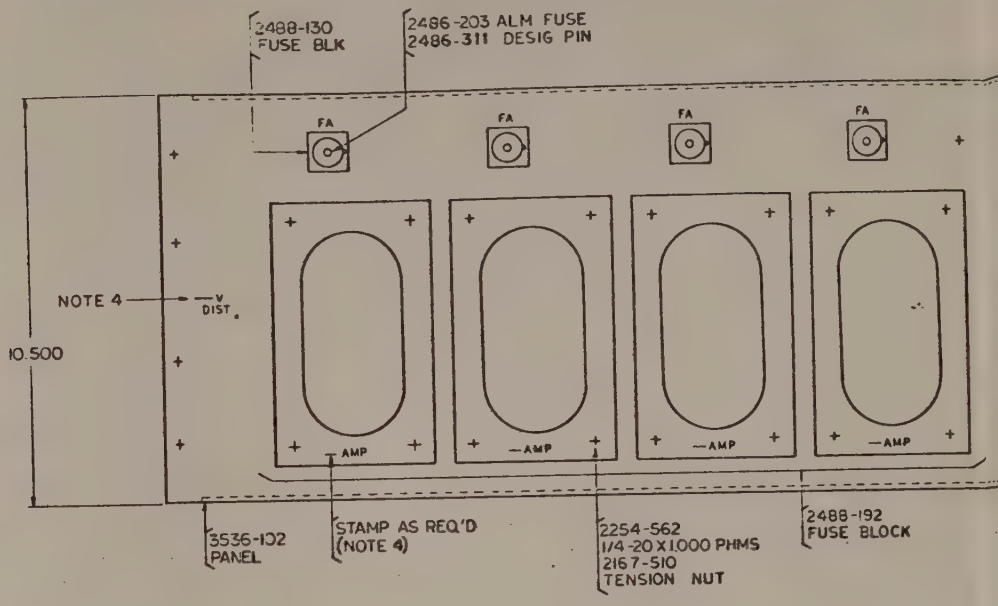
ASSEMBLY TERMINATION PANEL
ASSY ARRANGED FOR BATTERY & RECTIFIER TERMINATION & DISCH SHUNT MTG
(3-1/2 x 23 HR MTG)

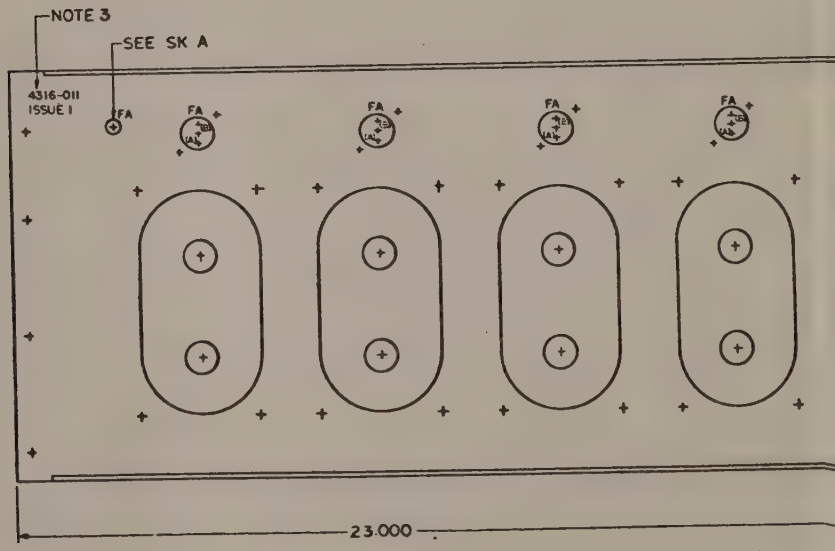
MATERIAL:

FINISH

LORAIN *Products Corporation*
LORAIN, OHIO
LORAIN PRODUCTS (CANADA) LTD. ST. THOMAS, ONTARIO

		SCALE NONE	DO NOT SCALE
		4341 016	
		1	1


2488-130
FUSE BLK
2486-203 ALM FUSE
2486-311 DESIG PIN
FA
FA
FA
FA
NOTE 4
V
DIST.
10.500
AMP
AMP
AMP
AMP
3536-102
PANEL
STAMP AS REQ'D
(NOTE 4)
2254-562
1/4-20 X 1.000 PHMS
2167-510
TENSION NUT
2488-192
FUSE BLOCK


NOTE 3
SEE SK A
4316-011
ISSUE 1
FA
FA
FA
FA
FA
23.000

TOOL RECORD

MANUFACTURING NOTES

X	X	1. ( ) DENOTES DESIGNATIONS SHOWN FOR REFERENCE ONLY.
X		2. ALL STAMPING TO BE 3/16" CHARACTERS UNLESS OTHERWISE SPECIFIED.
X		3. STAMP PNL ASSY NO AND ISSUE NO. IN APPROX POSITION INDICATED.
X		4. STAMP VOLTAGE, FUSE CAPACITY & FUNCTION (CHG OR DIST) AS REQ'D.
X		5. FUSES (LINK TYPE), TERM LUGS, ADAPTERS, BUS BAR & ASSOC MTD MAT'L ARE NOT PROVIDED & SHALL BE FURNISHED PER JOB INFORMATION.
X		6. FOR WIRING SEE DWG.NO. 0311-912.

ENGINEERING NOTES

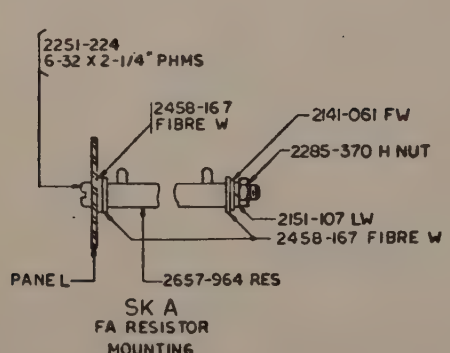
51. SPECIFY DISCH TERM LUG SIZES & OPERATING VOLTAGE AS REQ'D

52. DISTRIBUTION FUSES (LINK TYPE) ARE NOT FURNISHED & SHALL BE SPECIFIED AS REQ'D (CONSULT FACTORY FOR SPECIAL UNLISTED SIZES)

TYPE	CAPACITY
CHASE SHAWMUT "RL"	70, 100, 150, 200, 225, 250, 300, 350, 400, 450, 500, 600.

REVISIONS

ITR NO.	CHGD BY / CHG ORD NO.	DATE	DESCRIPTION
1			NEW



SK A
FA RESISTOR
MOUNTING

NOTICE

THIS DRAWING IS THE PROPERTY OF LORAIN PRODUCTS CORPORATION AND INCLUDES PROPRIETARY INFORMATION. DO NOT REPRODUCE OR DISTRIBUTE WITHOUT PERMISSION OF THE OWNER. THE DRAWING IS NOT TO BE USED TO MAKE APPARATUS OR FOR PROCUREMENT PURPOSES, OTHER THAN FROM LORAIN PRODUCTS CORPORATION, EXCEPT UNDER WRITTEN AGREEMENT WITH THE OWNER.

FIRST USED ON	NEXT ASSY	SIZE D
	MODEL NO.	

LORAIN PRODUCTS CORPORATION
LORAIN, OHIO
LORAIN PRODUCTS (CANADA) LTD. ST. THOMAS, ONTARIO

ASSEMBLY
FUSE PANEL
600A MOLDED FUSE BLOCKS
(61-600A LINK FUSES)
(24V, 48V, 130V PLANTS)
(10-1/2" X 23" R.R. MTG.)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCE ON FRACTIONS ± 1/32 DECIMALS ± 0.020 ANGLES ± 1°	DESIGN	SCHUBERT 3-18-75
	DRAWN	3-18-75
	CHECKED	J. Mullins 3-19-75
	CHECKED	3-19-75
	APPROVED	3-20-75
MATERIAL	SCALE	DO NOT SCALE
		4316-011
FINISH		SHEET 1 OF 1

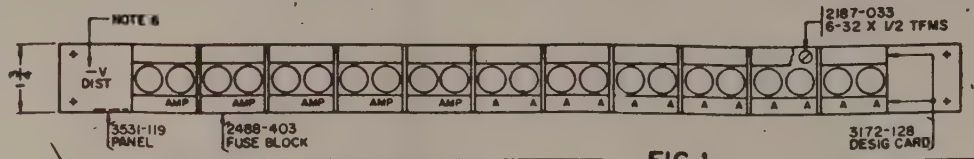


FIG 1
(4318-405)

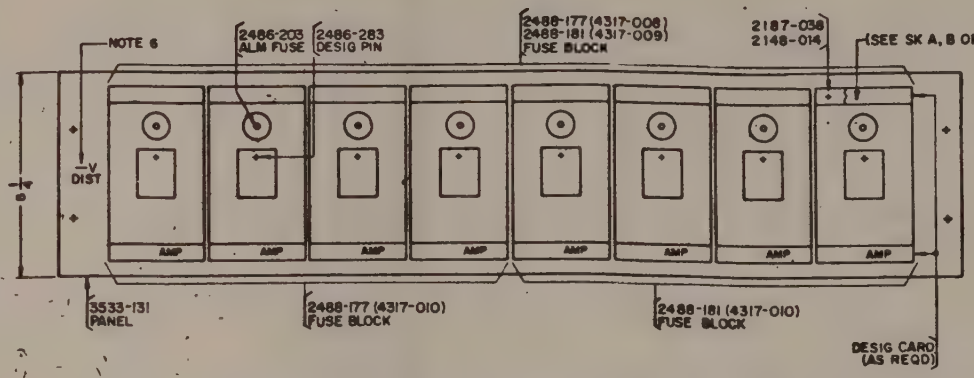


FIG 2
(4317-008, 4317-009, 4317-010)

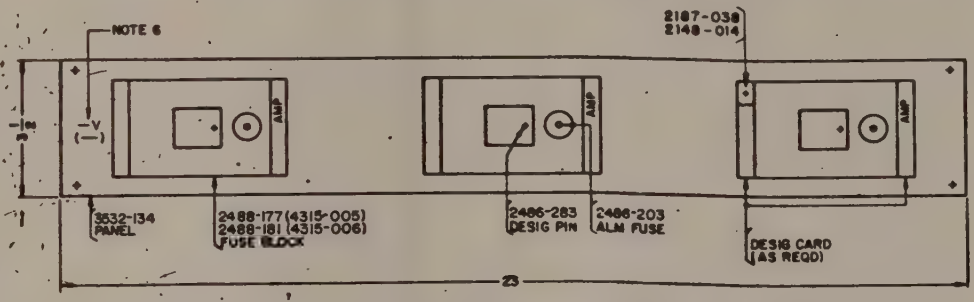
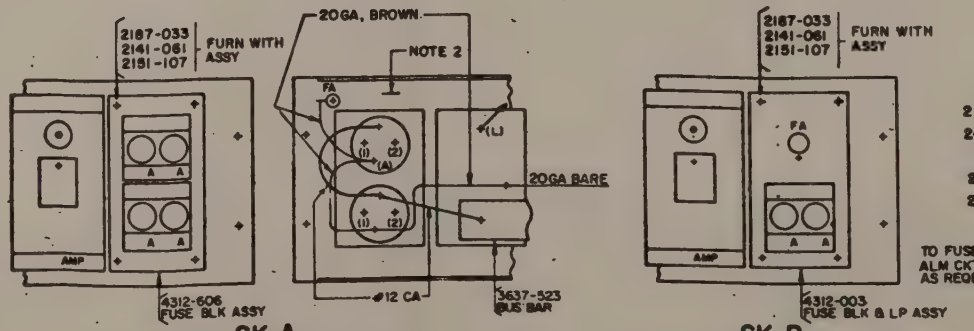
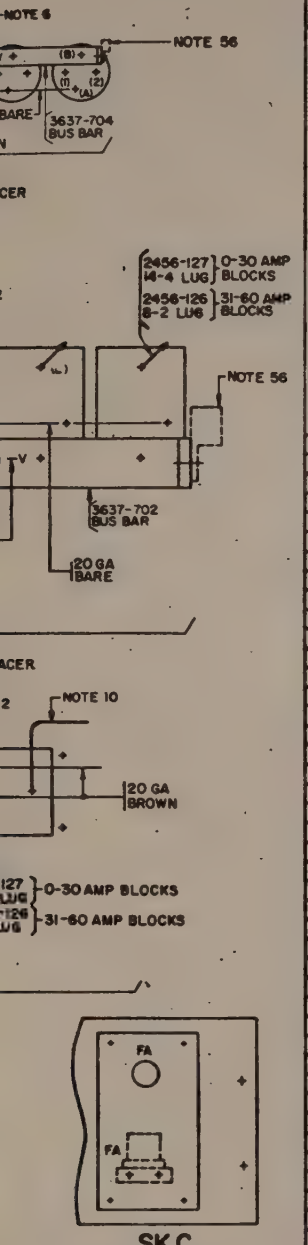


FIG 3
(4315-005 & 4315-006)



SK A
APPARATUS ARRANGEMENT -4317-009
(OTHERWISE SAME AS FIG 2)

SK B
APPARATUS ARRANGEMENT- 4317-011
(OTHERWISE SAME AS FIG 2 & SK A)
(NOTE 5A)



SK C

TYPICAL FUSE ALARM RELAY & LAMP ASSY (SEE 4265-018 & 4265-021) (NOTE 55)

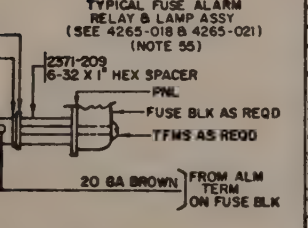


FIG A
ALARM RESISTOR WIRING & WIRING (PER FUSE PNL) (NOTE 8)

ENGINEERING NOTES

51 ALM FUSES (2486-203-70K) ARE FURN. FOR CART TYPE MTGS ONLY. DIST FUSES (CART & 70 TYPE WITH ASSOC DESIG PINS) ARE NOT FURN & SHALL BE ORDERED AS REQUIRED.

70 TYPE ALM FUSES		DESIGNATION PINS	
AMPERE	LPC PART NO	LPC PART NO	
1/4	2486-202 (70F)	2486-282	(VIOLET)
1/2	2486-205 (70G)	2486-284	(RED)
3/4	2486-206 (70H)	2486-286	(BROWN)
1-1/3	2486-208 (70A)	2486-289	(WHITE)
2	2486-212 (70B)	2486-292	(ORANGE
3	2486-215 (70E)	2486-294	(BLUE)
5	2486-217 (70D)	2486-297	(GREEN)

52. SPECIFY OPERATING VOLTAGE AS REQUIRED.

53 WHEN 0-30A AND/OR 31-60A FUSE PANELS ARE TO BE INTER-CONNECTED, ORDER (1) 3476-102 LINK & (1) 2276-406, (2)2141-101, (1)2151-111 & (1)2285-570 1/4-20 MTG MATL.

54. ASSY 4317-011 IS FOR SPECIAL APPLICATION & IS NOT FOR USE WITH STANDARD CODED PWR BDS. SPECIFY 24V OR 48V ALM LAMP AS REQ'D.

55. WHEN FUSE PNL IS TO BE MODIFIED FOR FUSE ALARM LAMP & RELAY ASSY SPECIFY VOLTAGE & POLARITY.

56. ORDER INPUT LUG KIT PER TABLE A AS REQD.

SHOP	INST
X	
X	
X	
X	
X	X
X	
X	
X	
X	
X	

MANUFACTURING NOTES

1. ( ) ITEMS NOT ASSEMBLED, SHIPPED LOOSE.
2. STAMP PNL ASSY. & ISSUE NUMBER IN APPROX POSITION INDICATED.
3. DIST FUSES ARE NOT PROVIDED & SHALL BE FURN PER JOB INFORMATION.
4. ALL STAMPING TO BE 3/16" CHARACTERS UNLESS OTHERWISE SPECIFIED.
5. ( ) DENOTES DESIGNATIONS SHOWN FOR REFERENCE ONLY.
6. STAMP 24V, 48V OR 130V & CHG OR DIST IN ACCORDANCE WITH JOB INFORMATION.
7. SEE DWG 0311-912 OR 913 FOR WRG. INFO.
8. FOR SPECIAL FUSE ALARM APPLICATIONS DISREGARD FIG A & FURN ALARM WIRING PER 0311-913 OR ASSOC JOB DWG.
9. RESERVED.
10. USE 8 GA INTERCONNECTING CA FOR 4315-005, 4 GA FOR 4315-006.

REDRAWN & REVISED 1140AS1. DESCR READ 4-70 TYPE FUSES. CHANGE ORDER 12497 3-23-65

DT 10

ITEM 44 ADDED. CHANGE ORDER 16715 11-17-66

P.Y. 11

1140AS & 1140AS1—ITEM 18, QUAN OF 1 REMOVED & ITEM 19 ADDED. NOTE 8 REMOVED. CHANGE ORDER 16721 12-4-66

P.Y. 12

NOTE 9 REMOVED. NOTE 55 REVISED. NOTE 8 & SK C ADDED. CHANGE ORDER 1831028 8-21-72

T.F.M. 13

FUSE BLOCK MTG HDWR, RES. MTG BRKT & LUGS CHGD. FIG. A & NOTES REVISED. NOTE 56 & TABLE A ADDED. CHANGE ORDER 1835354 11-14-77

J.R. 14

ITEM 31 & 32 QUANTITIES CORRECTED. MTG HDWE CORRECTED. CHANGE ORDER 1836587 5-17-78

15

4317-011	4317-009	4315-006	4317-010	4317-008	4315-005	4317-409	4318-405	PART NO.	DESCRIPTION	NOTE	ITEM
28	32	12	32	32	12	28		2148-014	#6 (.157 X .300) SPRING WASHER		45
1	1	1	1	1	1	1	1	2151-107	#6 SPLIT LOCKWASHER		
1	1	1	1	1	1	1	1	2141-061	#6 (.156 X .312 X .036) F.W		40
2	2	2	2	2	2	2	2	2458-167	11/64 X 7/16 X .064 FBR WASH		
28	32	12	32	32	12	28		2187-038	6-32 X 1-1/4 FHTFMS		
1	1	1	1	1	1	1	1	2251-224	6-32 X 2-1/4 PHMS		
							22	2187-033	6-32 X 1/2 TFMS		35
	8	3	4					2456-126	, 8-2 GA		
7			4	8	3	7		2456-127	TERM LUG, 14-4 GA		30
1	1	1	1	1	1	1	1	2657-964	RES (TAPPED), 2500Ω, 10W		
1	1	1	1	1	1	1	1	2371-209	6-32 X 1" HEX SPACER		25
	1	1	1					3172-116			
1			1	1	1	1		3172-129			
1						1	1	3172-128	DESIGNATION CARD		20
1						1		3637-523			
	1		1	1				3637-702			
							1	3637-704	BUS BAR		15
7	8	3	8	8	3	7		2486-283	DESIG PIN, EYELET TYPE (VIOLET)		
7	8	3	8	8	3	7		2486-203	ALM FUSE, 1/4 AMP		
1								4312-003	FUSE BLOCK & LAMP ASSY		
						1		4312-606	FUSE BLOCK ASSY, (4) 70 TYPE		10
	8	3	4					2488-181	, 31-60 A		
7			4	8	3	7		2488-177	, 0-30 A		
							11	2488-403	FUSE BLOCK, (2) 70 TYPE		5
		1			1			3532-134			
1	1		1	1		1		3533-131			
							1	3531-119	PANEL		1

SEVEN 0-30 AMP FUSES, TWO 70 TO TYPE FUSES & ASSOC ALM LAMP (4317-011)	EIGHT 31-60 AMP FUSES (4317-009)	THREE 31-60 AMP FUSES (4315-006)	FOUR 0-30 AMP FUSES & FOUR 31-60 AMP FUSES (4317-010)	EIGHT 0-30 AMP FUSES (4317-008)	THREE 0-30 AMP FUSES (4315-005)	SEVEN 0-30 AMP FUSES & FOUR 70 TYPE FUSES (4317-409)	TWENTY-TWO 70 TYPE FUSES (4318-405)	DESCRIPTION
								DWG NO.

23" FUSE PANEL MOUNTINGS FOR

REFERENCE INFORMATION

(FORMERLY J-603-37)

STOCKLIST & ASSEMBLY
DISTRIBUTION FUSE PANEL
(MOLDED FUSE BLOCKS)
0-60 AMPERE
(24V, 48V, 130V PLANTS)
(23" RR MTG)

LORAIN PRODUCTS CORPORATION.
LORAIN, OHIO
LORAIN PRODUCTS (CANADA) LTD., ST THOMAS, ONTARIO

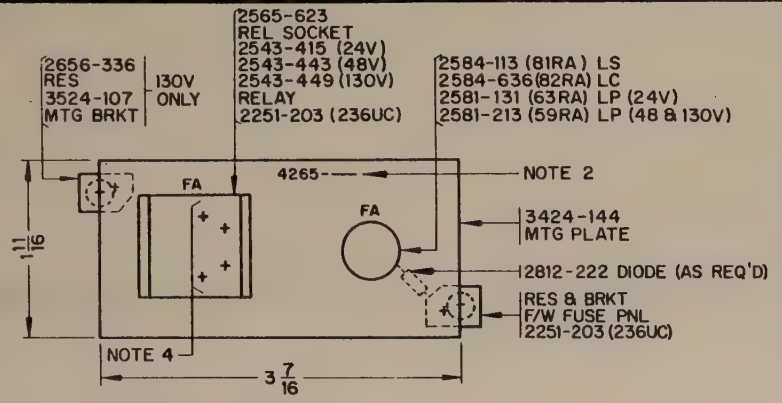
DWG SIZE D

TABLE A	
INPUT LUG KITS	
RATING	PART NO.
14-4 AWG	4835-523
8-2 AWG	4835-524
2-1/0 AWG	4835-525
4-3/0 AWG	4835-526
1/0-350 MCM	4835-527

DRAWN BY SJS DATE 6-13-62
CHECKED BY DATE 6-18-62
APPROVED BY DATE 6-18-62
RATING STANDARD 15

4318-405
4317-409
4317-011
4317-010
4317-009
4317-008
4315-006
4315-005

PRINTED IN U.S.A.



REVISIONS				
ISS NO.	CHGD BY — CHG SLIP NO	DATE	DESCRIPTION
1		9-6-68	
2	T.F.M. 18778	3 25 70	MISC PT. NO. CORRECTED.
3	T.F.M. 1831477	12 22 71	NOTE 4 ADDED.
4	T.F.M. 1831900	5 25 72	IN NOTE 4, COIL WAS FACING LEFT. NOTE 5 ADDED.

MANUFACTURING NOTES

1. ALL STAMPING TO BE IN 1/8" CHARACTERS.
2. STAMP ASSEMBLY NO. ON REAR IN APPROX POSITION INDICATED.
3. FOR WIRING INFORMATION SEE SD-2411-01, TABLE A.
4. RELAY TO BE MOUNTED WITH THE COIL FACING RIGHT WHEN VIEWED FROM THE FRONT.
5. FOR VERTICAL ARRANGEMENT USE 3424-147 MOUNTING PLATE (SEE 4318-407).

ENGINEERING NOTES

51. SPECIFY THE FOLLOWING ASSY & VOLTAGE AS REQUIRED:
    4265-021 (24V)
    4265-022 (48V)
    4265-023 (130V)
52. THESE ASSYS REPLACE TWO 0-5A (2488-403) FUSE BLOCKS (HORIZONTALLY MOUNTED) IN 19" & 23" FUSE PANELS.

4265-023
4265-022

FIRST USED ON	NEXT ASSY		SIZE
	MODEL NO.		B

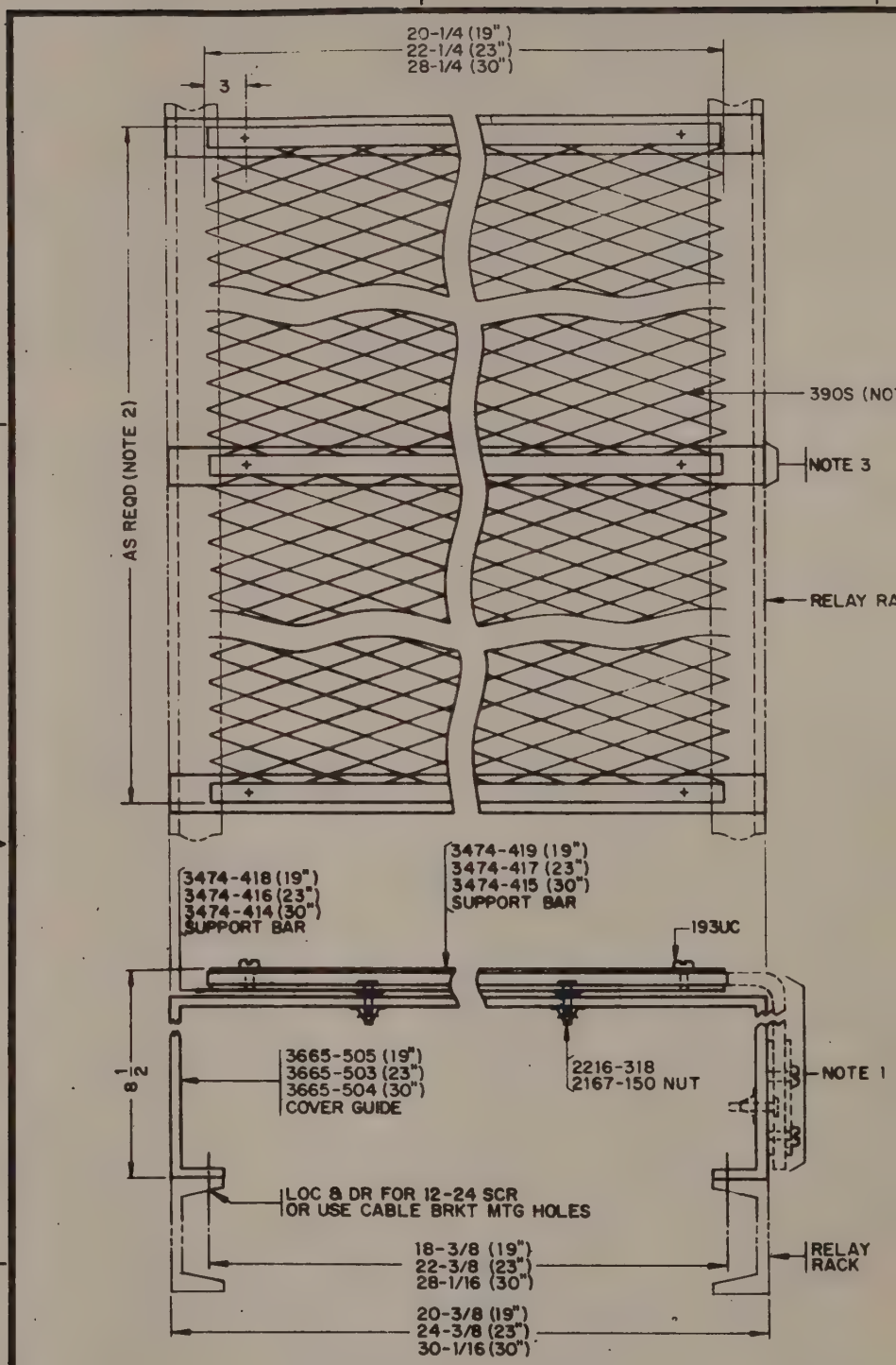
LORAIN PRODUCTS CORPORATION
LORAIN, OHIO
LORAIN PRODUCTS (CANADA) LTD. ST. THOMAS, ONTARIO

ASSEMBLY

FUSE ALM LAMP & RELAY
(24V, 48V & 130V OPERATION)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE ON FRACTIONS ±1/32 DECIMALS .00 ±.031 ANGLES ±1.5°	DESIGN ENGR	DATE
	DRAWN P.Y.	9-6-68
	CHECKED	11-13-68
	CHECKED	
MATERIAL:	APPROVED	11-13-68
	4265-021	
FINISH:	SCALE	DO NOT SCALE

LP380-R2


20-1/4 (19")
22-1/4 (23")
28-1/4 (30")
3
AS REQD (NOTE 2)
390S (NO
NOTE 3
RELAY RA
3474-418 (19")
3474-416 (23")
3474-414 (30")
SUPPORT BAR
3474-419 (19")
3474-417 (23")
3474-415 (30")
SUPPORT BAR
193UC
8 1/2
3665-505 (19")
3665-503 (23")
3665-504 (30")
COVER GUIDE
2216-318
2167-150 NUT
NOTE 1
LOC & DR FOR 12-24 SCR
OR USE CABLE BRKT MTG HOLES
18-3/8 (19")
22-3/8 (23")
28-1/16 (30")
RELAY
RACK
20-3/8 (19")
24-3/8 (23")
30-1/16 (30")

SHOP	INST	MANUFACTURING NOTES
X		1 WHEN SIDE IS REQ'D ON COVER, LOCATE & DRILL FOR CATCH; CUT & FORM GRILLE AS REQ'D. FURNISH MTG MAT'L & THE FOLLOWING PARTS (QUAN AS REQUIRED) — 2975E & 2976E.
X		2. CUT 390S GRILLE MATERIAL TO LENGTH PER JOB CONDITION. WHEN DETERMINING LENGTH, 193UC PHMS MUST ENGAGE FULL DIAMOND OF MATL.
		3. DELETE OR ADD COVER GUIDES & SUPPORTS AS FOLLOWS: UP TO 20" (APPROX) LENGTH — 2 SETS 21" TO 40" (APPROX) LENGTH — 3 SETS 41" TO 60" (APPROX) LENGTH — 4 SETS

ISS. NO	CHANGE SLIP NO.	DWG CHKD BY	DATE	REVISION
1			7-1-66	
2	16753 P.Y.	3 17 67		ASSY 4141-404 ADDED.
3	18719 J.A.M.	7 23 68		GUIDE & SUPPORT BARS FOR 19" COVER INCREASED TO 3. NOTES 2 & 3 ADDED.
4	1832269 L.S.M.	10 17 72		ITEM 16 WAS 2372-342. NOTE 1 CORRECTED.

4141-403	4141-402	PART NO	DWG OR CODE NO	DESCRIPTION	NOTE	ITEM
						20
12	9	2167-150		PUSH-ON-NUT		
12	9	2216-318		10-32 X 3/4" PHMS		
12	12	2251-207		6-32 X 1/2 PHMS		15
3		3474-415		[		
3		3474-414		,30"]		
	3	3474-417		[		10
	3	3474-416		,23"]		
		3474-419		[		
		3474-418		SUPPORT BAR, 19"]		
3		3665-504		[,30"	3	
	3	3665-503		,23"]	3	5
		3665-505		COVER GUIDE, 19"	3	
		390S		EXPANDED PVC GRILLE	2	1

4141-404
4141-403

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCE ON FRACTIONS ± 1/32, DECIMALS ± 0.015, ANGLES ± 1.5°

SIZE C

30" COVER ASSEMBLY (8-1/2 DEEP)

23" COVER ASSEMBLY (8-1/2 DEEP)

BUS BAR COVER ASSYS
FOR 19", 23" & 30" POWER BOARDS

LORAIN *Products Corporation*
LORAIN, OHIO
LORAIN PRODUCTS (CANADA) LTD. ST. THOMAS, ONTARIO

DR. BY RGS	DATE 7-1-66	SCALE	
CH. BY RGS	DATE 7-1-66	4141-402	
CH. BY	DATE		
APP. BY H.J.V.	DATE 7-6-66	SHEET	OF